

School of Computing
& Information Systems

***An exploration of shift-to-shift clinical handover and clinical
handover improvement using a user-centred approach at the
Royal Hobart Hospital, Tasmania, Australia***

by

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Ming Chao Wong

November 2011

Abstract

This research explores shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine using a user-centred approach and highlights the outcomes associated with using this approach. This research presents findings that contribute to an improved understanding of shift-to-shift clinical handover and to the role that an electronic tool can play in clinical handover improvement.

Clinical handover involves the transfer of information, professional responsibility and accountability for patient care from one clinical team to another either temporarily or permanently. With changes in doctors' working hours and an increasing demand for flexible work practices, the need for mechanisms to support effective and efficient handover processes for transferring information, responsibility and accountability has become recognised as increasingly important for the delivery of high quality safe health care. Clinical handover has been identified as a high risk scenario for patient safety with dangers of discontinuity of care, medical errors, adverse events and the potential for legal claims of malpractice.

With the emergence of debates on ehealth, a role for information systems has been promoted but there remains limited evidence on the impact of these systems on clinical handover. More broadly however, it is evident that the experiences of information systems in health care has not always been successful and that there might be consequences to patient safety after their implementation. In this context, one set of approaches for improving the uptake and use of information systems recommends acquiring a detailed understanding of users needs through direct user engagement. These user-centred approaches have been proven successful in the development and implementation of ehealth systems.

Based in the Department of General Internal Medicine the user-centred approach led to the conduct of a case study grounded in clinician (particularly interns and registrars) experiences, attitudes and insights towards clinical handover. The methodology used in this research adopted a subjective ontology and an interpretive epistemology. The research strategy involved a three phased approach. Phase One involved the use of thirty-eight observation sessions and seventeen semi-structured interviews with three clinician groups - interns, registrars and consultants, to facilitate an in-depth understanding of clinical handover and clinical handover improvement within the Department of General Internal Medicine and also build rapport and trust with the participants. Phase Two involved the use of two focus groups with one group consisting of six interns and the other consisting of five registrars to validate the results obtained from Phase One before moving forward with design of the electronic tool. All participants were then invited to participate in four design workshops to work through the requirements of the electronic tool. Phase Three consisted of ten further observation sessions and fourteen semi-structured interviews three months after the introduction of the electronic tool to further explore the participant's understanding, expectations and experiences of clinical handover after involving them in the clinical handover improvement initiative.

The data collected through all three phases were analysed using open axial and selective coding drawing on the principles of grounded theory. After analysing the data independently in each

phase, the data were then analysed and interpreted across the three phases to allow for the key findings to emerge. These key findings were then interpreted and discussed based on the researcher's understanding of the data and in relation to the available literature. The key findings that emerged are as follows:

- Clinical handover is a complex, dynamic and evolving clinical system and its status needs to be viewed from a contextual, clinical and user perspective.
- A formal education and training program with established standards is imperative for clinical handover improvement.
- Clinical handover culture is important in clinical handover improvement and the development of a clinical handover culture requires an incremental approach.
- The understanding of clinical handover amongst clinicians varies and this variability in understanding significantly influences the behaviours of clinicians during clinical handover and practice of clinical handover.
- The strongest personal attributes that influence clinical handover and clinical handover improvement are cultural background and individual personalities.
- Various factors affect clinical handover but it is the nature of these factors and their interrelationships that influence team dynamics which in turn influence clinical handover and clinical handover improvement.
- There is a significant difference between perceived and actual handover. This difference has a significant impact on clinical handover especially in the development of electronic tools.
- Clinical handover serves various different functions and these functions change after the introduction of electronic clinical handover support tool.
- An over-arching user-centred approach is important to engage all users before conducting user-requirements for electronic clinical handover support tool design and implementation.
- While a user-centred approach is extremely useful, there are many challenges associated with this approach in clinical handover improvement and quality and safety initiatives.
- If an electronic tool is to be introduced for clinical handover improvement, it is imperative to mandate the use of the electronic tool for all clinical handover sessions.

This research has made a number of contributions at substantive, methodological and theoretical levels. At a substantive level, it has contributed to the understanding of clinical handover and clinical handover improvement and provided guidance on how an Information systems researcher can conduct research in a clinical setting. This research has made a significant contribution to clinical handover improvement through the use of a user-centred approach as this approach has since been developed further and incorporated as the national guidelines for clinical handover improvement (OSSIE guide). This research has also informed further work conducted in the

utilisation of electronic tools in clinical handover which has since been developed into the national guidelines for safe use of electronic tools in clinical handover (SafeTECH).

At a methodological level, this research has illustrated the importance of using an over-arching user-centred approach within a multi-snapshot case study to understand clinical handover and clinical handover improvement. This research has suggested that the use of a user-centred approach within a multi-snapshot case study is very important in obtaining a clear understanding of clinical practice which is not clearly defined from the users' perspective. This research has also contributed at a methodological level by demonstrating that the use of qualitative research techniques drawing on the principles of grounded theory to generate an understanding of a clinical process which is not clearly defined is highly valuable.

At a theoretical level, this research has developed a conceptual understanding of clinical handover from three perspectives: a contextual perspective, clinical perspective and a user perspective. This conceptual understanding of clinical handover opens up new areas for future research.

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Chapter 1 Introduction

1.1 Introduction

This research explores shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine using a user-centred approach and highlights the outcomes associated with using this approach. This chapter is divided into the following sub-sections:

- Section 1.2 provides the background to this research and outlines the conceptual framework in which this research was conducted. This research lies within the intersection of three key domain areas – clinical handover, user-centred approaches and electronic tools, within a broader discourse of quality and safety in health care.
- Section 1.3 introduces the research problem based on the gaps identified in Section 1.2. There is a need to understand clinical handover and identify solutions which might assist in the process as previous clinical handover improvement handover initiatives have met with limited success. A user-centred approach was used as the over-arching conceptual framework in this research as user-centred approaches have proved to be successful in the design of information systems.
- Section 1.4 states the research questions and associated research objectives in relation to the research problem identified in Section 1.3.
- Section 1.5 describes the context in which this research took place. It provides an overview of public hospitals in Australia, the Royal Hobart Hospital and the Department of General Internal Medicine which was the field site for this research.
- Section 1.6 describes the research approach adopted. A multi-snapshot case study using a user-centred approach was deployed over three phases to understand clinical handover and clinical handover improvement from the users' perspectives, develop an electronic tool together with the users and assess the influence of involving the users in clinical handover improvement.
- Section 1.7 presents a summary of the contributions of this thesis at a substantive, methodological and theoretical level.
- Section 1.8 provides an overview of the structure of this thesis and outlines of chapters to follow.
- Section 1.9 provides a summary reflection of this chapter.

1.2 Background

Medical errors are a common occurrence in health care delivery (Wilson and Van Der Weyden, 2005, Baker *et al.*, 2004, Department of Health, 2001, Schiøler T *et al.*, 2001, Kohn *et al.*, 1999, Wilson *et al.*, 1999). Human factors and information factors have been identified as being

important factors to address in trying to combat medical errors (Aarts and Nøhr, 2010, Wilson *et al.*, 1999). From a human factor viewpoint, fatigue has been identified as one of the impacting factors of quality and safety in the delivery of clinical care (West *et al.*, 2009, Lockley *et al.*, 2007, Wilson *et al.*, 1999). Different countries have started to implement strategies to reduce the working hours of health care professionals, particularly doctors (Australian Medical Association, 2006b, Australian Medical Association, 2006a, British Medical Association, 2004). This reduction in the number of working hours per shift leads to an increase in the number of shifts over the same time period and the continuity of patient care becomes increasingly important. Studies have shown that inadequate clinical handovers are associated with discontinuity of patient care and medical errors (Alem *et al.*, 2008, Wong *et al.*, 2008, Ye *et al.*, 2007, Bomba and Prakash, 2005, Horn *et al.*, 2004). There is therefore a strong need to improve clinical handover so that patient care is not compromised.

Efforts to improve clinical handover have been centred on the need to ensure adequate information transfer from one team to another (Australian Medical Association, 2006b, Australian Medical Association, 2006a, Australian Council for Safety and Quality in Health Care, 2005). Given the cost-effectiveness and reliability of ICTs in information delivery, many studies and guidelines have therefore advocated the use of ICTs in clinical handover improvement (Australian Medical Association, 2006a, Petersen *et al.*, 1998). Studies have demonstrated significant improvements in information transfer using ICTs in clinical handover (Cheah *et al.*, 2005, Van Eaton *et al.*, 2005, Petersen *et al.*, 1998). However, a direct relationship between improvement in information transfer and improvement in clinical handover has not been clearly established. It is unclear as to what constitutes an effective and efficient handover. The Australian Council for Quality and Safety in Health Care¹ (2005) conducted a study on the factors which impact on clinical handover and indicated that there was an urgent need to define clinical handover, its functions, determine what constitutes an effective and efficient handover as well as how to improve clinical handover. Given the rapidly changing work patterns, particularly of junior doctors, there continues to be an urgent need to understand clinical handover and clinical handover improvement.

There is a strong view in health care that more information is better and it is important to have the right information at the right place at the right time. As such, ICTs have been seen as the panacea to quality and safety improvements in health care. Health informatics plays a key role in shaping our understanding of the role of communication in health care processes and in designing interventions to support improved communication (Toussaint and Coiera, 2005). ICTs appear to be a promising means for restructuring many communication processes (Toussaint and Coiera, 2005) including increasing information access, improving information delivery, update and evaluation.

The implementation of ICTs in health care to improve quality and safety however, has achieved mixed results (Turner *et al.*, 2005). While some studies have demonstrated significant benefits and improvements in patient care (Bates and Gawande, 2003), others have either met with mixed

¹ The Australian Council for Quality and Safety in Health Care ceased its activities from 31 December 2005 and the Australian Commission for Quality and Safety in Health Care took over responsibility for many of the Council's documents and initiatives from 2006.

success or failed to generate their forecasted benefits (Harrison *et al.*, 2007, Bates *et al.*, 2003, Littlejohns *et al.*, 2003). In some studies, the implementations of ICTs have actually created new problems and errors within the health care system (Borycki and Kushniruk, 2008, Han *et al.*, 2005). Given strong advocacy through guidelines (Kohn *et al.*, 1999) and the vast amount of resources and funding which have been allocated for implementation of electronic solutions to health care (Coiera, 2007), there is an urgent need to generate a better understanding of the effect of the implementation of ICTs in health care.

Analysis of the successes and failures of technology solutions has led to the conclusion that the outcomes are not always due to the technology itself but the integration of socio-technical aspects and user acceptance with the technology (Aarts *et al.*, 2010, Wears and Berg, 2005, Ash *et al.*, 2004a). This has led to recommendations for the utilisation of socio-technical approaches in the design, implementation and evaluation of information systems in health (Aarts *et al.*, 2010, Coiera, 2004, Jadad and Delamothe, 2004, Berg *et al.*, 2003) as well as the adoption of user-centred approaches for information communication technology (ICT) development and implementation within health care systems (Thielst and Gardner, 2008, Ammenwerth *et al.*, 2006). However, this continues to be a challenge despite the awareness of the need to engage users at a practical level, especially within the health care sector. There are a limited number of case studies illustrating this approach and the benefits of involving clinicians as co-participants in the design, implementation and evaluation of health IT systems (Ammenwerth *et al.*, 2006, Coiera, 2006, Wears and Berg, 2005). Engaging clinicians for IT development within the health care sector remain limited and lag behind other sectors (de Rouck *et al.*, 2008).

Importantly, while many socio-technical approaches and user-centred design methods advocate involving users, users are commonly only involved after a decision has been made to utilise ICTs (Shah and Robinson, 2007, Shah and Robinson, 2006). The engagement of users commonly involve the design and implementation of ICTs (Sutcliffe *et al.*, 2010) and not in the decisions about whether ICTs might be suitable.

As such, the research space that this thesis describes lies in the intersection between three areas: 1. Clinical handover, 2. User-centred approaches and 3. Electronic tools in quality and safety in health care (see Figure 1). This research contributes to these three domains. It develops an understanding of clinical handover and clinical handover improvement, the use of a user-centred approach in clinical handover and clinical handover improvement and the design of an electronic tool for clinical handover.

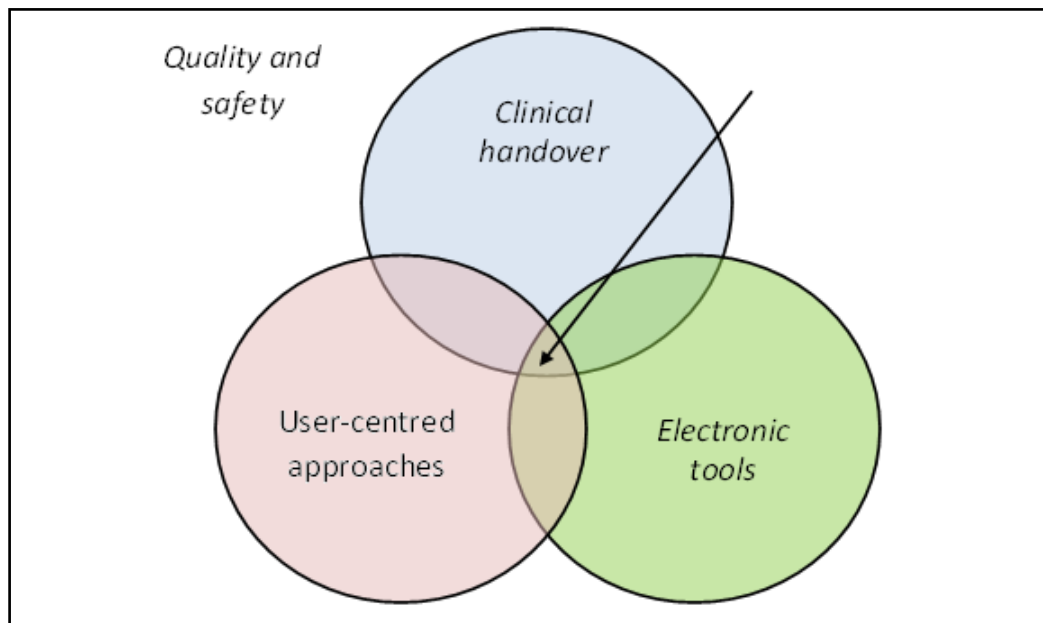


Figure 1: Location of research within broader discourses

1.3 Research problem

This thesis explores shift-to-shift clinical handover and clinical handover improvement using a user-centred approach at the Royal Hobart Hospital's Department of General Internal Medicine using a user-centred approach and highlights the outcomes associated with using this approach.

Clinical handover is vital in maintaining the quality and safety of patient care (Australian Council for Safety and Quality in Health Care, 2005). Recent recognition that fatigue impacts on clinical performance and therefore the quality and safety of patient care delivered has led to decisions being made to limit working hours of junior medical officers. This change has necessitated a better understanding of clinical handover practice and to offer solutions to improve clinical handover (Australian Medical Association, 2006a). Published literature identify gaps in clinical handover practice and articulates the danger of poor handover practices including increased patient harm, increased risks of litigation and reduced job satisfaction (Wong *et al.*, 2008). While there more studies are now emerging in this area (Ryan *et al.*, 2011, Thompson *et al.*, 2011, Chaboyer *et al.*, 2010, Joy *et al.*, 2010, Chaboyer *et al.*, 2009, Raptis *et al.*, 2009), effective and evidence based clinical handover improvement strategies remain limited particularly where ICTs have been utilised.

Electronic tools have been advocated as one of the methods in improving clinical handover clinical handover (Australian Medical Association, 2006a, Australian Council for Safety and Quality in Health Care, 2005, Junior Doctors Committee, 2004). However, there is limited research describing the use of electronic tools in clinical handover or clinical handover improvement (Wong *et al.*, 2008). While the available literature have described the potential benefits of using electronic tools in clinical handover improvement, there was little or no description about how the electronic tool was designed and implemented and whether clinicians were involved at any stage of the design and implementation of the electronic tool (McGee-Lennon *et al.*, 2007,

Chacko *et al.*, 2006, Morrison, 2006, Cheah *et al.*, 2005, Morris and Baker, 2005, Van Eaton *et al.*, 2005, Petersen *et al.*, 1998).

It is well known in the field of information systems (IS) that engaging and involving the users in the design and implementation of ICTs will lead to the development of a product that caters to the users' needs resulting in a higher rate of acceptance and utilisation (Elf *et al.*, 2007, Weber-Jahnke and Price, 2007). There are many user-centred design techniques available for this purpose, e.g. participatory design (Kensing *et al.*, 2007), user-centred design (ISO 13407, 1999), usability testing and human factors engineering (Beuscart-Zephir *et al.*, 2007).

The Royal Hobart Hospital has a strong interest in reducing medical errors and improving patient safety. The Department of General Internal Medicine at the Royal Hobart Hospital was chosen as the study site due to the strong leadership and innovative culture in improving quality and safety of patient care delivery within the department. The Department of General Internal Medicine had undergone a significant change in structure, both for junior and senior clinicians² prior to this research study. The changes in shift work had necessitated a better solution for clinical handover. The Department of General Internal Medicine had already started to investigate solutions which might assist in clinical handover improvement, including the development of protocols and an education program. These solutions, however, had not achieved the intended outcomes. There is therefore, clearly a need to adopt a different approach to understanding and examining clinical handover from the perspective of the user, in order to suggest better solutions to improve clinical handover.

This case study research provides an opportunity to explore shift-to-shift clinical handover and clinical handover improvement that is grounded in the clinicians' experiences using a user-centred approach and engage the clinicians in the development and implementation of an electronic tool for clinical handover.

1.4 Research questions and research objectives

Given the research problem identified above, the following provides a list of research questions and associated research objectives which aim to address the research problem.

RQ1:	What is the status of shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine?
<i>RQ1-O1:</i>	<i>To explore the participant's understanding, expectations and experiences of clinical handover.</i>
<i>RQ1-O2:</i>	<i>To identify previous clinical handover improvement initiatives undertaken.</i>
<i>RQ1-O3:</i>	<i>To identify the factors that impact on clinical handover and clinical handover improvement.</i>

² For the purposes of this research, clinicians refer to medical practitioners.

RQ2: What clinical handover improvement insights are generated from using a user-centred approach?

RQ2-O1: To identify insights from the participants that can be utilised in clinical handover improvement.

RQ2-O2: To incorporate the insights generated into the design of an electronic tool for clinical handover.

RQ3: What outcomes can be achieved from the use of a user-centred approach in clinical handover improvement?

RQ3-O1: To explore the benefits of a user-centred approach on clinical handover improvement.

RQ3-O2: To explore the limitations of a user-centred approach on clinical handover improvement.

1.5 Research context

The following provides the context of this research. It provides an overview of public hospitals in Australia, the Royal Hobart Hospital and the Department of General Internal Medicine which was used as the field site for this research.

1.5.1 Public hospitals in Australia

At the time of the research there were 762 public hospitals in 2007-08 with 56,467 available beds. Tasmania had a total of 27 hospitals consisting of 3 major hospitals and 24 others. Under the 2003-08 Australian Health Care Agreements, the Australian Government will provide an estimated \$42 billion to the states and territories over the life of the agreements to assist them in providing free public hospital services for public patients. There were approximately 4.7 million patient admissions to public hospitals in 2007-08 which is an increase of over 4.4% from the previous year. Approximately 67% of public hospital admissions were for acute medical care, 18% were admitted for surgery, 6% for medical procedures, 6% for maternity services and the remaining 3% for non-acute services such as palliative care. The average length of stay for overnight admissions was 6.6 days (Department of Health and Ageing, 2007).

1.5.2 The Royal Hobart Hospital

The Royal Hobart Hospital is Tasmania's largest hospital with 2,190 full time equivalent staff, providing acute, sub-acute, mental health and aged care inpatient and ambulatory services to a population of approximately 240,000 people in the Southern Region. It currently operates from a maximum base of 550 physical beds which include 460 acute overnight and 90 day beds. As a major centre of clinical teaching and research, it has strong collaborations with the University of Tasmania and other institutions. The Royal Hobart Hospital provides a comprehensive range of state wide general and specialty medical and surgical services including cardiothoracic surgery, neurosurgery, burns treatment, hyperbaric and diving medicine, neonatal intensive care and high-risk obstetrics. Critical care services include a 24hr 7 day a week Emergency Department consisting of 41 treatment spaces and resuscitation bays, an assessment and planning unit, and a short stay observation unit, a 9 bed intensive care unit and a 5 bed high dependency unit.

1.5.3 Department of General Internal Medicine

The Department of General Internal Medicine accepts care of patients who have medical issues requiring further investigation and management. Medical specialty units such as cardiology and gastroenterology usually only accept a select group of patients requiring invasive procedures by their respective specialities. Any other patients requiring care are usually admitted under the Department of General Internal Medicine.

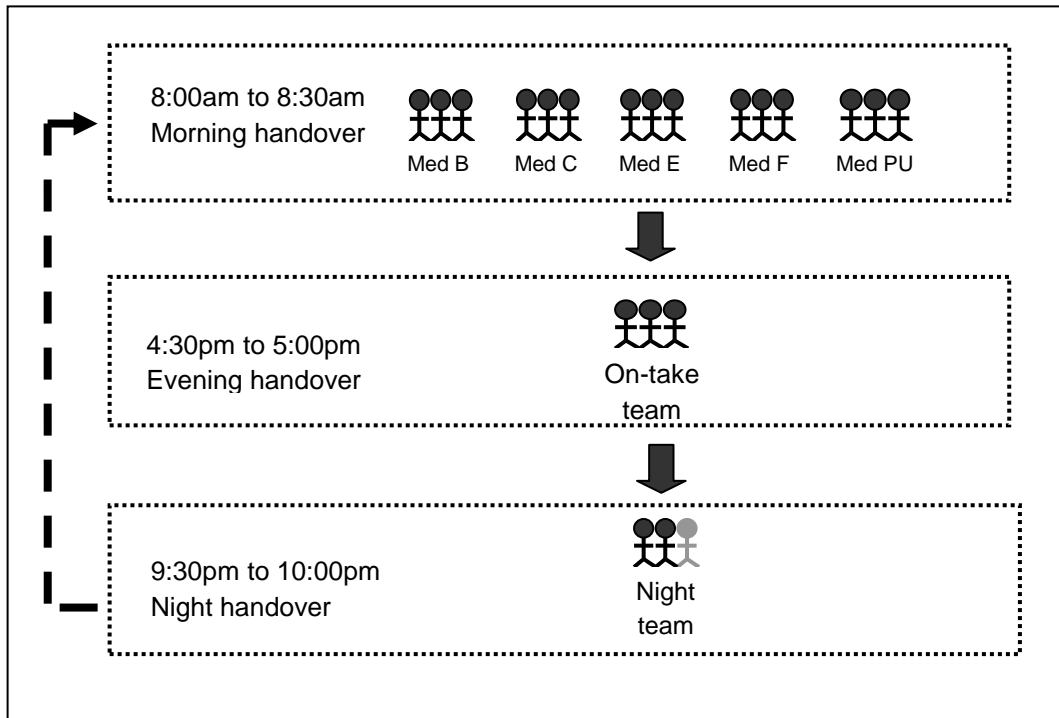


Figure 2: Department of General Internal Medicine staffing structure (Weekdays)

The Department of General Internal Medicine consists of five medical units – Medical unit B (Med B), Med C, Med E, Med F and Med PU (see Figure 2). Each unit consists of an average of two consultants³ (one full time equivalent), one registrar⁴ and one intern⁵. Each unit accepts patient admissions based on a rotating roster and has an average of ten inpatients at any one time. A normal working day starts at 8:00am and ends at 5:00pm. From 5:00pm each weekday, all patients under the care of the Department of General Internal Medicine are serviced by an after-hours medical team (on-take team⁶) consisting of an on-call consultant, a registrar and two interns. The on-take team works from 8:00am till 10:00pm which includes a handover at 9:30pm to the night team. The night team consists of an on-call consultant, a registrar and one intern. This intern has to cover ward calls for both general medicine and general surgery.

³ A consultant is a senior medical practitioner who has fully completed his or her specialist training.

⁴ A registrar is a medical practitioner who is currently receiving advanced training in their chosen specialist field in medicine in order to eventually become a consultant.

⁵ An intern is a recent medical graduate who must complete one year in an accredited training hospital before obtaining full registration.

⁶ An on-take team is the medical team who is responsible for all patient admissions in a 24hr period.

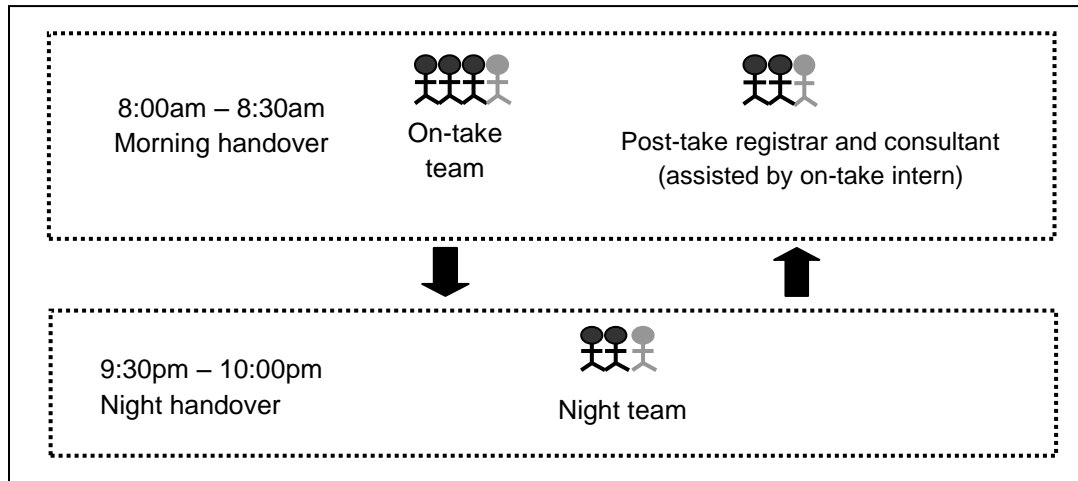


Figure 3: Department of General Internal Medicine staffing structure (Weekends and public holidays)

During weekends and public holidays (see Figure 3) the on-take team works from 8:00am – 10:00pm. The on-take team consists of a registrar and two interns who are physically present in the hospital and a consultant who is on-call. The on-take team then hands over to the night team consisting of a registrar and an intern who are physically present in the hospital and a consultant who is on-call. The night team works from 9:30pm – 8:30am. A post-take⁷ registrar and a post-take consultant work from 8:00am – 12:00md. They are assisted by one of the interns from the on-take team. They get handed over to by the night team. Saturdays and Sundays are serviced by different teams of medical professionals.

General medicine is an area that requires a great deal of cognitive activity in order to plan for further investigations and the management of patients. Some of these patients are very sick and have the potential to deteriorate rapidly. However, others may stay in the hospital for an extended period of time with little change to their clinical condition. It is important to note that the after-hours team and the night team have to look after 50-100 inpatients that they are unfamiliar with, although it is acknowledged that most of these patients do not require special care during these shift periods. The handover of patient care is therefore temporary. The content of the handover mainly covers tasks required to be completed, rather than a thorough analysis of their clinical presentation and diagnostic or management decision making processes.

1.6 Research approach

This thesis explores shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine using a user-centred approach and highlights the outcomes associated with using this approach.

A multi-snapshot case study involving a grounded approach within a conceptual framework emphasising user-centred approaches was deployed in the conduct of this research over three phases (see Section 3.3.2). This approach was chosen firstly to overcome the limitations of a single snapshot case study (Walsham, 1995) but also because previous approaches have not provided sufficiently rich insight into the practice of clinical handover and clinical handover improvement. Multiple cohorts of interns rotate through the department each year. There are

⁷ Post-take refers to the day after on-take.

also possible new staff changes at the beginning of each year and it was valuable to ascertain if there were major differences in the data obtained in the different cohorts. The researcher was interested in specifically identifying insights from the participants that could be used in clinical handover improvement.

The original plan was to collect data over three time periods consisting of extended weekends whereby clinical handover was vital due to the fact that the patients were looked after by a reduced number of clinical staff who were not familiar with their conditions and overall care. However, as an opportunity arose for the researcher to be involved in the development and implementation of an electronic tool for clinical handover, the plan for data collection was revised to accommodate the development of the electronic tool and allow for further data collection after the introduction of the electronic tool. The researcher also made use of the opportunity of being involved in the development of the electronic tool to obtain an understanding of clinical handover from the participants' perspective and at the same time continue to identify participant insights for clinical handover improvement.

The aim of Phase One was to obtain an in-depth understanding of clinical handover and clinical handover improvement initiatives which had been carried out in the Department of General Internal Medicine and also to obtain participant insights for clinical handover improvement. Data collected in Phase One was in the form of observation field notes, semi-structured interviews and a compilation of clinical handover notes⁸ (see Section 3.5.1). The interview data was recorded and then transcribed and analysed drawing on the principles of grounded theory. Data collected in the form of observation field notes and compilation of clinical handover notes were used to inform the analysis of the semi-structured interviews (see Section 3.6.1) which formed the core data set for Phase One of this research. The data obtained from Phase One provided a starting point for the commencement of Phase Two.

The aim of Phase Two was two-fold – to assist the Department of General Internal Medicine in developing and implementing an electronic tool for clinical handover and also continue to understand clinical handover and clinical handover improvement and obtain participant insights for clinical handover improvement. Data collected in Phase Two was in the form of focus groups and design workshop (see Section 3.5.2). Extensive notes were taken in the focus groups and design workshops as participants had previously expressed concerns at being recorded in group sessions. Data collected was analysed drawing on the principles of grounded theory (see Section 3.6.2). The data obtained in Phase Two served to confirm or refute insights obtained from Phase One and also generate further user requirements for clinical handover improvement.

The aim of Phase Three was to continue to obtain an in-depth understanding of clinical handover and clinical handover improvement after the introduction of the electronic tool. More specifically, the researcher was interested in exploring the influence of the electronic tool on clinical handover and also the influence of adopting a user-centred approach to clinical handover improvement. As in Phase One, data collection in Phase Three consisted of observation notes,

⁸ As the researcher did not have any medical knowledge and in order to ensure patient confidentiality, the clinical handover notes were analysed by the clinical handover project registrar who was the registrar responsible for implementing clinical handover improvement initiatives.

semi-structured interviews and compilation of clinical handover notes (see Section 3.5.3). The interview data was recorded and then transcribed and analysed drawing on the principles of grounded theory. Data collected in the form of observation notes and compilation of clinical handover notes were used to inform the analysis of the semi-structured interviews which formed the core data set for Phase Three of this research.

To summarise, the research approach adopted in this thesis is a multi-snapshot case study conducted over three phases that aims to understand clinical handover and clinical handover improvement from the participants' perspectives, to develop an electronic tool together with the participants and to assess the influence of involving the participants in clinical handover improvement following the introduction of the electronic tool.

1.7 Contributions to knowledge

This research makes a number of contributions to the information systems discipline and to quality and safety in healthcare, especially in the area of clinical handover research at three levels, substantive, methodological, and theoretical. These are described below.

1.7.1 Substantive level

At a substantive level, this research has contributed in three areas: Clinical handover improvement, the use of electronic tools in clinical handover improvement and the conduct of IS research in a clinical setting.

Firstly, this research has illustrated the use of an over-arching user-centred approach for data collection drawing on the principles of grounded theory for data analysis to understand clinical handover, clinical handover insights and apply the insights obtained into a clinical handover improvement strategy. This approach has engaged users as the primary drivers in the process and has laid the foundations for further work conducted across different clinical settings in the development of a "how to" guide for clinicians and managers for clinical handover improvement known as the OSSIE Guide (Australian Commission on Safety and Quality in Health Care, 2010). The OSSIE guide has been endorsed as the national guideline in Australia for clinical handover improvement. This contribution is significant as the OSSIE is based on the research methodology utilised in this research. The OSSIE guide however has simplified the methodology adopted in this research to provide clinicians with a step-by-step guide to understand clinical handover in their own context and to derive solutions for clinical handover improvement. This research has therefore contributed significantly at a substantive level to knowledge about approaches to clinical handover improvement.

This research highlights the various considerations that must be taken into account in order to increase the likelihood of success in the use of an electronic clinical handover tool. This includes the understanding of clinical handover and an existing culture of good handover. The electronic tool might refine and improve the culture of clinical handover incrementally but cannot be expected to stimulate or lead to the development of a positive clinical handover culture that minimises risk. This research which has focused on the use of an electronic tool in a clinical setting has also informed further work in the area involving different healthcare organisations in different states in Australia. This research has informed further work conducted to develop national guidelines in the safe use of electronic tools in clinical handover and has contributed at a

substantive level to the development and implementation of electronic tools for clinical handover improvement.

This research has identified various challenges in involving IS researchers in conducting research into a clinical practice that is not well-defined and the role of IS researchers in facilitating the development of an electronic tool using a user-centred approach. This has made a significant contribution at a substantial level and provided guidance for future IS researchers in engaging clinicians in research in clinical practices.

1.7.2 Methodological level

This research has contributed at a methodological level to approaches aimed at enhancing IS research into quality and safety in healthcare.

At a methodological level, this research has contributed in two ways. Firstly it has illustrated the importance of the use of an over-arching user-centred approach within a multi-snapshot case study to understand the practice of clinical handover. Secondly, it has contributed to the use of methods drawing on the principles of grounded theory to generate an understanding of the process of clinical handover and assist in the development of an electronic tool drawing on the principles of participatory design in an attempt to improve the process of clinical handover. Further data was collected and analysed after the introduction of the electronic tool as part of clinical handover improvement to provide further insights the outcomes of using an over-arching user-centred approach over three phases.

The use of a multi-snapshot case study approach is useful for complex clinical processes like clinical handover that are dynamic and evolving. The user-centred approach used within this multi-snapshot case study allowed for a longitudinal understanding of the clinical handover process from the users' perspectives and allowed for the emergence of relationships within each phase and between each phase. The key findings of this research only emerged after analysis of the relationships between three phases which allowed for a better understanding and interpretation of the data. As a result, this research argues that a multi-snapshot approach is essential in clinical environment to understand clinical processes which are complex and dynamic.

Secondly, the over-arching methodological approach used in this research has contributed to IS research and research into quality and safety in healthcare. The dichotomy between using an interpretivist qualitative research to understand a clinical practice and the desire to improve that clinical practice from a quality and safety perspective is bridged through the use of this methodological approach. This research firstly argues the need to understand clinical handover from three perspectives as it is a complex process through data collected and analysed through primarily interviews which are further informed through observation sessions and clinical handover notes drawing on the principles of grounded theory. Through the initial data analysis and interpretation, this thesis argues that the insights generated can then be applied to assist in the process of engaging users to develop clinical handover improvement strategies and the development of an electronic tool drawing on the principles of participatory design. The process of developing and implementing clinical handover improvement strategies and tools further provides data to refine the interpretation of the clinical handover process and conceptual understanding of the process. Finally, further data collection after the implementation of clinical

handover improvement strategies and tools serve to provide information systems researcher with rich data and insights to provide a holistic understanding of the process, and also serve to provide quality and safety experts with further understanding and refinement of the improvement process.

1.7.3 Theoretical level

This research contributed to knowledge at a theoretical level from the perspectives of IS research and research conducted in quality and safety improvements. This research highlights that clinical handover needs to be viewed as a clinical information system operating within a broader context of clinical practice. As a result, this research proposes that clinical handover needs to be viewed from a contextual perspective, a clinical perspective and a user perspective.

This contribution challenges the current understanding of clinical handover both from an IS viewpoint and a quality and safety viewpoint. Two extensive literature reviews (Wong *et al.*, 2008, Australian Council for Safety and Quality in Health Care, 2005) conducted prior to this research and after this research have not identified any conceptual models to assist in the understanding of clinical handover. More importantly, clinical handover is thought to be a well-defined clinical practice within any individual organisation and easily understood. As such, interventions and tools have been designed to assist clinical handover without consideration of conceptual understanding of what clinical handover constitute and how these interventions could be considered from the lens of theoretical conceptual understanding of clinical handover.

This research has provided evidence that questions the underlying assumptions in regard to the homogenous practice of clinical handover and has also provided a conceptual understanding of clinical handover which has contributed to approaches now recommended by the Australian government for clinical handover improvement.

Clinical handover is a complex and dynamic clinical information system that evolves over time. From a contextual perspective, the understanding of clinical handover is influenced by national and international initiatives to raise awareness of the practice. This understanding is further influenced by hospital and departmental factors which when combined provide a contextual understanding of clinical handover at a particular point in time. From a clinical perspective, it is important to understand the role of clinical handover within complex systems of clinical practice to deliver patient care. The nature of the transfer of patient care as well as the timing of clinical handover within a particular shift are both important factors influencing the practice of clinical handover. From a user perspective, different clinicians of different seniorities have a different understanding of clinical handover and their requirements of clinical handover vary within their roles in clinical practice.

Having understood clinical handover from these three perspectives, this research has clarified that the purpose of clinical handover, especially the fact that information transfer in clinical handover is to achieve continuity of patient care through the transfer of responsibility and accountability.

1.8 Summary of following chapters

This section provides a brief overview of the remaining chapters in this thesis.

1.8.1 Chapter 2 – Literature Review

Chapter 2 provides an overview and critique of the core literature in the three key domain areas of relevance to this research – Clinical handover, user-centred approaches and the use of electronic tools in quality and safety in health care.

1.8.2 Chapter 3 – Methodology

Chapter 3 examines in detail the methodological approach of this research. The chapter addresses the philosophical stance adopted, the research strategy and procedures employed, the data analysis techniques applied and outlines the approach to the interpretation and discussion of the research.

1.8.3 Chapter 4 – Data analysis Phase One

Chapter 4 provides an in-depth discussion of the coding process and data analysis of the data obtained from the interviews, observations and field notes in Phase One. Five core categories have been identified and the relationship between the axial codes in each of the core categories is described. Finally, the relationships between the core categories are described.

1.8.4 Chapter 5 – Data analysis Phase Two

Chapter 5 provides an in-depth discussion of the coding process and data analysis of the data obtained from the focus groups in Phase Two. Five categories have been identified which are the same as Phase One. The relationship between the axial codes in each core category is described followed by the relationship between each core category.

1.8.5 Chapter 6 – Electronic tool development

Chapter 6 provides a narration of the process of developing the electronic tool for clinical handover based on the clinical handover improvement insights and user requirements generated in Phases One and Two.

1.8.6 Chapter 7 – Data analysis Phase Three

Chapter 7 provides an in-depth discussion of the coding process and data analysis of the data obtained from interviews, observations and field notes in Phase Three, after the introduction of the electronic tool. Five categories have been identified and the relationship between the axial codes in each core category is described followed by the relationship between each core category.

1.8.7 Chapter 8 – Integration of analysis and interpretation across three phases

Chapter 8 provides an integration of the data analysis conducted separately over the three phases presented in Chapters 4 (Phase One), Chapter 5 (Phase Two) and Chapter 6 (Electronic tool development) and Chapter 7 (Phase Three). This chapter brings together the analysis of the results over the three phases and explores the relationships between the axial codes within a core category and between core categories to detect changes or similarities in the relationships which might have occurred and provides an interpretation as to why those changes occurred.

1.8.8 Chapter 9 – Interpretation and discussion of key findings

Chapter 9 presents the key findings which have emerged from the integrated analysis and interpretation of the data in the Chapter 8. The key findings are presented along with an interpretation and discussion in relation to available literature. These key findings are then used to answer the stated research questions and objectives.

1.8.9 Chapter 10 –Findings and conclusion

Chapter 10 provides a synthesis of the key findings presented in this thesis. It also provides a discussion about the contributions this research has made at a substantive, methodological and theoretical level. This chapter then highlights the limitations of the research followed by suggesting possible future research in this area.

1.9 Chapter reflections

This chapter has provided the background to this research. The research problem has been discussed together with the research questions and research objectives. The contributions this thesis has made at three levels – theoretical, methodological, practical has been presented. This chapter has concluded with a summary review of the remaining chapters in the thesis.

A review of the previous research on clinical handover and clinical handover improvement forms the background to this study. Prior to data collection, a review of the literature revealed that while clinical handover had been acknowledged as being vital in maintaining the quality and safety of patient care, effective and evidence based clinical handover improvement strategies were scant. Electronic tools have been advocated to improve clinical handover but there was limited literature providing guidance on how electronic tools should be developed and implemented to assist in the process. Within this context, a set of research objectives and primary research questions were presented in this chapter to explore clinical handover and clinical handover improvement in one department at a tertiary hospital in Australia.

The next chapter provides a review of the literature in the key domain areas relevant to this thesis – clinical handover, user-centred approaches and electronic tools in quality and safety in health care.

Chapter 2 Literature Review

2.1 Introduction

This chapter provides a review of the literature in the three key domain areas relevant to this research: clinical handover, user-centred approaches and the use of electronic tools within a broader discourse of quality and safety in healthcare.

- Section 2.2 provides some background to quality and safety issues in healthcare delivery and introduces several quality and safety models available. It then goes on to discuss the role of information and technology in patient safety and the use of electronic tools in the quality and safety domain.
- Section 2.3 provides a review of the clinical handover literature. It starts by defining clinical handover followed by a discussion of clinical handover in the quality and safety context. Problems associated with clinical handover and the factors affecting clinical handover are then highlighted and the section concludes with a discussion about efforts made to improve clinical handover.
- Section 2.4 provides a review and discussion of user-centredness followed by the benefits of the adoption of user-centred approaches in healthcare. It highlights that users can be involved at a passive level and an active level and provides examples in each level as to how users are involved.
- Section 2.5 provides a review of the clinical handover literature post-data collection as there had been an increasing amount of attention to clinical handover as the Australian Commission on Safety and Quality in Health Care took on the role as the lead technical agency to develop clinical handover solutions for the World Health Organisation's patient safety initiatives in 2007.
- Section 2.5 provides a summary reflection of this chapter.

2.2 Quality and safety

Medical errors and adverse events are a common occurrence in healthcare delivery. Professor Richardson estimated that 4,500 patient deaths are caused by medical errors each year in Australia hospitals (Armstrong, 2004). Wilson *et al.* (1999) found that 16.6% of hospital admissions in Australia were associated with adverse events in a retrospective review of records in New South Wales. Belloma *et al.* (2002) conducted a prospective study in Australia a few years later but also revealed similar statistics despite efforts being made over the years to improve patient safety. In the United States (US), it is estimated that avoidable deaths in hospitals arising from medical errors are between 44,000 and 98,000 each year costing the system an estimated \$29 billion (Kohn *et al.*, 1999). A report in the United Kingdom (UK) showed that the estimated rate of adverse events is around 10% of all admissions (Department of Health, 2001).

Many efforts have been made by healthcare institutions in an attempt to improve the quality and safety of patient care. Some of these solutions include evidence based medicine, total quality

management, professional development standards, accreditation and patient empowerment (Turner *et al.*, 2005). Unfortunately despite these efforts, the impact of each approach on improving the quality and safety of patient care has not been adequately evaluated. There is often a lack of coordination and integration of these various initiatives to achieve better and safer care.

“There is a need for integrated methods and comprehensive programs that combine, for instance, evidence-based guidelines, clinical pathways, indicators for continuous assessment, and quality improvements projects embedded within a wider quality system of a hospital or practice...However, we lack information on the impact of such complex interventions. Most quality improvement activities in the world are still largely a reflection of the specific beliefs of specific parties about the best way to improve patient care” (Grol, 2001:2584)

2.2.1 Models for quality and safety

There are different models which attempt to explain the occurrence of medical errors and adverse events in healthcare delivery. The dominant model is one that advocates personal perfectionism (Reason, 2000). This personal approach to errors believes that errors only occur in professionals who are not well trained and creates that culture of “blame and shame” (Reason, 2000). The approach to quality and safety based on this model therefore emphasises the importance of extensive training for healthcare professionals.

Unfortunately, adverse events have continued to occur because of systemic inadequacies and human fallibility prompting some researchers to advocate learning about errors from other industries (e.g. aviation, nuclear power). Reason (2000) proposed the Swiss Cheese Model of medical errors to explain the systemic contributions to error causation (see Figure 4) . The slices of cheese represent how defences, barriers and safeguards can be penetrated by an accident trajectory.

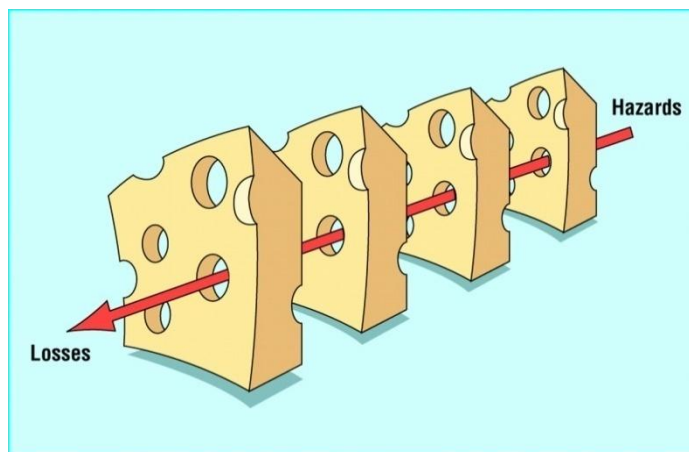


Figure 4: Swiss cheese model of error causation (Reason, 2000:769)

The Swiss Cheese Model emphasises the latent systemic factors and the active factors and event in causing errors and adverse events. According to Reason (2000), for every error that occurs, there must be many latent systemic factors which make the system vulnerable to errors. Quality and safety initiatives based on this model mainly focus on investigating and managing the

systemic factors (Reason, 2000). This model has created a paradigm shift from personal perfectionism to the management of systemic factors.

“We cannot change the human condition, but we can change the conditions under which humans work.” (Reason, 2000:769)

It is important to note that managing systemic factors is insufficient in ensuring patient safety. Most patient care in acute hospital settings is delivered by junior staff. However, these junior staff have little power in changing the system and conditions in which they work. It is therefore argued that creating “error wisdom” is probably as important amongst frontline workers as emphasising the management of systemic factors (Reason, 2003).

While the above models try to provide an understanding of medical errors and propose some solutions which might be able to reduce medical errors, healthcare is a complex system involving many different processes to deliver quality care. As such, one single strategy might be unsuccessful in addressing all the processes to improve the quality and safety of care. Lillrank (2003) proposed that healthcare processes be divided into three different types – standard, routine and non-routine processes (see Figure 5). These processes can be described using the broom as a metaphor. The stick end of the broom is the rigid area where standard and repetitive operations are performed and this can be improved with automation (Lillrank and Liukko, 2004). The bundle of straw represents non-routine and non-repetitive activities that will require expert knowledge in order for quality and safety improvement (Lillrank and Liukko, 2004). The connector represents activities which are routine and where guidelines might be of assistance (Lillrank and Liukko, 2004).

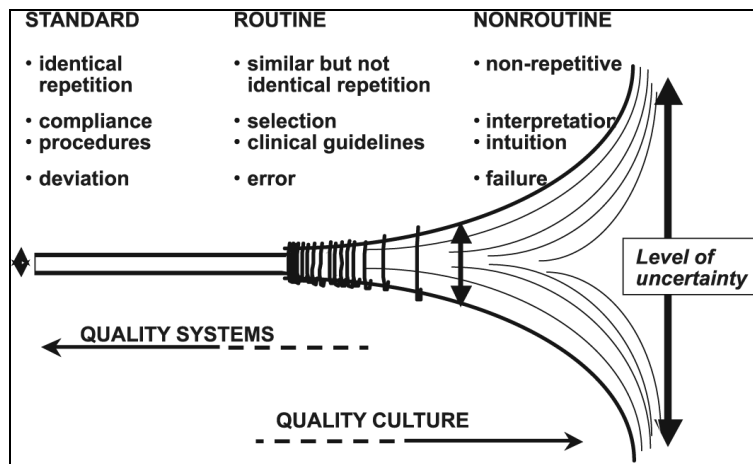


Figure 5: The quality broom (Lillrank and Liukko, 2004:44)

2.2.2 The role of handover and information for patient safety

Many factors play a part in contributing to patient safety. Human factors have been considered as one of the most important factors, especially fatigue which impacts on clinical performance. Safe working hours have been advocated in Europe, US and Australia to reduce fatigue. This reduction in working hours per shift results in an increase in the number of shifts amongst healthcare workers. Shift-to-shift clinical handover therefore has become very important to ensure continuity of patient care.

There are various ways to improve clinical handover. Electronic tools have been proposed amongst many other strategies to improve clinical handover. The underlying assumption of utilising electronic tools to improve clinical handover and other clinical processes is that good clinical care can only be provided when the information is available at the right place at the right time.

Many medical errors are attributed to the absence or inadequacy of information at different points in the process of care delivery. While differentiating between what is too much or too little is difficult, Table 1 attempts to provide a simple conceptualisation of some of the consequences for medical errors that are often attributed to information factors (Turner *et al.*, 2005).

Current health care systems are poor at collating and analysing available information within different sections of the health sector to assist in the delivery of patient care. From the perspective of patient care, optimal treatment is often affected by the lack of adequate information. When analysed in great detail, however, there remains little research into what constitutes “good” information or “right” information and the effectiveness of “good” information (Turner *et al.*, 2005). Clinical decision making is often left to the clinicians’ judgement.

These points challenge the underlying assumptions about the role of information in medical errors and in patient care. Table 1 implicitly assumes a standard response by clinicians when correct and timely information is available which is problematic as clinicians are aware that in clinical practice, this cannot be assumed as information is usually only one factor (often not the most significant) amongst many others that contribute to medical errors (Turner *et al.*, 2005) .

	Diagnosis	Treatment	Preventive Measures	Others
Complete and timely information	Correct diagnosis	Correct and timely treatment	Adequate preventative measures	Timely correction
Incomplete or Incorrect information	Delayed or incorrect diagnosis	Delayed or incorrect treatment	Delayed inappropriate preventative measures	Delayed correction
No information	Delayed or incorrect diagnosis	Delayed or incorrect treatment	Limited preventative measures	No capacity to rectify problems
Too much information	Any of the above	Might cause repeated treatments	Might miss effective measures	Conflicting action/plans

Table 1: The role of information in medical errors (Turner *et al.*, 2005)

2.2.3 Electronic tools for patient safety

Electronic tools have been advocated internationally as one of the most important advances which will transform quality and safety in healthcare (Pearce and Haikerwal, 2010). The assumption that the availability of information is the most important aspect to improve quality and safety has been the basis for developing electronic tools to assist in information transfer.

While it appears that the use of electronic tools can improve cost effectiveness of information delivery, their exact role in medical error management remains unclear. The role of information transfer in ensuring safe patient care has not been well established. It is therefore important to conduct a review of the literature in order to obtain an understanding of the impact of electronic tools in the quality and safety of healthcare delivery.

2.2.3.1 Successes associated with implementation of ICTs

There are many areas where electronic tools have been reported to make a positive difference including computerised physician order entry (CPOE), decision support, monitoring, alerting, medication management, medical error reporting systems.

- **Computerised physician order entry**

Several studies examined the impact of CPOE systems and reported positive impact of these systems on medical errors (Ash *et al.*, 2004b). One of the earlier studies on CPOE investigated the impact of CPOE and team intervention on serious medication errors (Bates *et al.*, 1998). The study utilised quantitative data analysis to investigate the pre-intervention and post-intervention medication error rate. Random samples were drawn from medical and surgical units of the Brigham and Women's hospital over 6 months prior to the intervention and 9 months after the intervention. The study found a significant reduction of 55% in medication errors. The study also found that there were no differences between the pure CPOE intervention when compared with the intervention consisting of CPOE plus team intervention (Bates *et al.*, 1998). In a subsequent study, a decision support function was added to the CPOE with increasing sophistication over time (Bates *et al.*, 1999). Over 4 different time periods, with increasing decision support sophistication, the research team found a 81% reduction in non-missed dose medication error rate (Bates *et al.*, 1999). A systemic review which included 25 studies have concluded that it seems likely that CPOE might have a positive impact on reducing medication error with a reported relative risk reduction of 13%-99% (Ammenwerth *et al.*, 2008).

- **Clinical decision support systems**

Clinical decision support systems have been reported to improve the decision making process (Sim *et al.*, 2001). In an Australian study where simulated cases were used as an evaluation tool, different levels of support were provided, either with guidelines, laboratory reports or laboratory reports together with a decision support system (Sintchenko *et al.*, 2004). The study measured the effectiveness of the decision made amongst other parameters and found that a decision support system together with a laboratory report delivered the highest clinical impact score (Sintchenko *et al.*, 2004). The benefit of decision support systems in real-life clinical practice has also been documented. In a study to investigate the clinical decision support system for asthma and tuberculosis, it was found that computerised decision support systems provide significantly better support for clinicians compared to paper based guidelines (Thomas *et al.*, 1999). In a systemic review of clinical decision support systems consisting of 56 studies, it was found that decision support systems were effective in achieving better clinical care (Pearson *et al.*, 2009). The effect was greatest when used to fine-tune current treatment rather than for initiation or cessation of treatment (Pearson *et al.*, 2009).

- **Assistance with medication dose calculations and management**

Electronic tools have been used to assist with medication dosage and medication selection. Some significant benefits are reported in the literature. According to Roberts *et al.* (2010), the use of a combination of ICT support and academic detailing resulted in significant improvements in the prescription and dosing of renally cleared medication for patients admitted to the hospital with renal impairment. ICT interventions has also resulted in improvements in aminoglycoside dosing (Phillips *et al.*, 2008.) More importantly, ICT interventions can improve preventative care. A system built to remind doctors to provide deep venous thrombosis prophylaxis every time bed rest was ordered has resulted in improvements in behaviour in 46% of cases in the intervention group, as compared with 22% in the control group (Overhage *et al.*, 1997).

- **Monitoring and alerting of adverse events**

A system was designed to evaluate computerised prescribing for outpatients (Bates and Gawande, 2003). Large numbers of adverse events were identified through this system, which would not be routinely detected. This was deemed to have important implications for medical error and adverse event analysis (Chapman, 2001).

The above examples seem to suggest that ICT interventions can produce significant benefits in the delivery of better healthcare. ICTs can improve the quality and safety of healthcare delivery beyond what can be achieved with other support systems. Further analysis of the data, as well as the literature, however, cautions the positive reports from these studies.

2.2.3.2 Issues associated with the implementation of ICTs

While the implementation of ICTs has shown some successes and potential, problems have also been identified. ICTs might introduce new errors and cause work changes which significantly impact on the functions of the healthcare organisations, causing adverse events (Campbell *et al.*, 2006, Koppel *et al.*, 2005, Krushniruk *et al.*, 2005).

One of the ICTs within healthcare which attracts the most attention is the implementation of CPOE. Despite initial enthusiasm and successes in CPOE implementation, some data suggests that CPOE may in fact increase adverse events. Han *et al.* (2005) showed that the mortality increased after the implementation of ICTs. The outcomes of this study contradicts an earlier study within a similar clinical setting (Upperman *et al.*, 2005). These two studies started the debate on CPOEs and at a broader level, ICT implementation in healthcare and its impact in the delivery of clinical care.

This section does not provide a full summary and discussion about CPOE and its use a healthcare setting. Instead, this section aims to use CPOE as a basis to provide an understanding of the implementation of ICTs and its variable impact in healthcare as well as some of the factors which contribute to this variability.

A study which investigated adverse drug events over a nine months period at a university teaching hospital and showed a significant reduction in harmful adverse drug events (Upperman *et al.*, 2005). The study argued that CPOE can prevent one adverse drug event for every sixty-four patient day admissions (Upperman *et al.*, 2005). However, a controversial study in a paediatric setting investigated the differences in mortality between pre and post CPOE implementation (Han

et al., 2005). This study found that the overall mortality rate increased significantly from 2.8% to 6.57% and stimulated a huge debate regarding the implementation of CPOE in supporting clinical practice and patient safety. Another retrospective study conducted in a paediatric intensive care setting in the US found that there was an insignificant reduction in mortality after the implementation of CPOE compared with pre-implementation (Del Beccaro *et al.*, 2006).

The three studies described above highlight the range of possible outcomes from the implementation of ICTs in healthcare. Ammenwerth *et al.* (2006) conducted an analysis of these contradicting findings and found that the impact of ICT implementation is dependent on the organisational context and socio-technical activities rather than the technology itself. This analysis emphasises the need to view the positive and negative results based on the context of clinical practice (Ammenwerth *et al.*, 2006).

Following the publication of these three studies and the analysis of socio-technical issues relating to the implementation of ICTs, Aarts (2006) compared the different outcomes from implementing the same CPOE system in two Dutch hospitals and found that changes in medical workflow determined the outcome of the implementation of CPOE.

Many studies continue to emerge describing both positive and negative aspects of CPOE. For example, the implementation of a CPOE discharge tool in a cardiac ward has been shown to improve smoking cessation counselling and discharge instructions for patients with heart failure (Butler *et al.*, 2006). Similarly, CPOE has been shown to improve the use of red blood cell transfusion in the intensive care setting (Fernandez-Perez *et al.*, 2007). At the same time, studies have also reported incidences of unintended consequences relating to the implementation of CPOEs which negatively impact on clinical care (Campbell *et al.*, 2006). A study which investigated the outcomes of CPOE on medication prescription found that prescription error was common and the inconsistent communication in CPOE, despite standardisation created significant medication risks (Singh *et al.*, 2009).

The impact of CPOE is difficult to measure given the complexity of the healthcare system. However, there was no doubt that the implementation of CPOE had a significant impact on workflow (Aarts *et al.*, 2007). A review of the literature identified fifty-one publications describing the different impact of CPOE on workflow, some of which were positive while others were negative (Niazkhani *et al.*, 2009). It was found in a study to understand the process of medication use after the implementation of a CPOE system that users develop workarounds to bypass the technology or adapt work processes (Niazkhani *et al.*, 2011). Some of these help to improve workflow while others burden providers and may endanger patient safety. It is therefore very important when analysing the successes or failures of CPOE to do so through a socio-technical lens and to understand human, social and organisational issues relevant to the implementation of CPOE (Peute *et al.*, 2010).

ICTs however should and do have a significance role in healthcare improvement and adverse event reductions when the socio-technical issues are clearly considered. A system view therefore has the potential to enable hospitals to improve quality of care (Turner *et al.*, 2005). This however, will only be realised if ICTs are specifically designed and implemented, taking into account the clinical practice and socio-technical considerations (Turner *et al.*, 2005). There needs

to be a detailed understanding of the users and the interaction of users with technology and healthcare system in order to facilitate ICT design (Kushniruk and Turner, 2011, Turner *et al.*, 2005). Users need to be involved in every step of ICT design and implementation in order to develop and implement ICT for improvement in quality and safety of healthcare (Kensing *et al.*, 2007, Turner *et al.*, 2005).

2.3 Clinical handover

There is a lack of a uniform understanding about clinical handover despite the fact that it is commonly practised in the clinical setting. There are various definitions of clinical handover in the literature some of which define clinical handover as routine communication between health professionals and others focus solely on the transfer of information between health professionals (Wong *et al.*, 2008). This thesis has adopted the definition published by the British Medical Association and the Australian Medical Association.

“Clinical handover is the transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis” (Australian Medical Association, 2006a)

2.3.1 Clinical handover in the context of quality and safety

Medical errors are common in healthcare delivery. Wilson *et al.* (1995) found that 16.6% of admissions in acute hospitals were associated with errors. Similar statistics were reported in the United States (Kohn *et al.*, 1999) and the United Kingdom (Department of Health, 2001). Human factors, especially fatigue, has been identified as one of the most common factors associated with medical errors (Wilson *et al.*, 1999). The European Union has taken the initiative to reduce the working hours of junior medical officers in hospitals by introducing the European Working Directives which aims to progressively limit the working hours of doctors to a maximum of 48 hours per week (British Medical Association, 2004). Some states, such as New York, in the United States have introduced legislation to restrict the number of working hours of junior medical officers per week (New York State Department of Health., 1987). In Australia, the Australian Medical Association conducted an audit of the working hours of doctors and found that 62% of hospital doctors fall into significant risk and high risk categories of working patterns with 39 hours being the longest continuous number of hours (Australian Medical Association, 2006b).

Medical professionals continue to work long hours due to the concern that shorter working hours might adversely impact on patient care due to inadequate clinical handovers resulting in the discontinuity of patient care. Roughton and Severs (1996) found that inadequate medical handovers are associated with discontinuity of care and medical errors.

The World Health Organisation has acknowledged the role of clinical handover in delivering safe patient care and has identified clinical handover as one of the five priority areas in improving quality and safety known as the “High 5s initiative”. This is particularly important in the context of Australian healthcare as the Australian Commission on Safety and Quality in Healthcare is the leading technical agency in developing the standardised operating protocol for the “High 5s initiative”. As such, clinical handover is currently a significant area of interest amongst clinicians and healthcare managers (O’Leary, 2006).

2.3.2 Problems associated with clinical handover

Clinical handover is a clinical process carried out by clinicians on a day-to-day basis. It is estimated that seven million clinical handover sessions are conducted in Australian hospitals every year. However, clinical handover is an ill-defined process. More importantly, many clinicians believe that clinical handover is poorly conducted. In a survey conducted in the United Kingdom (UK) about clinical handover practice amongst junior doctors, 83% of the respondents believed that clinical handover is practiced poorly and that majority of clinical handovers occurred through verbal communications (Roughton and Severs, 1996). This is a problem as it has been shown in both medical (Bhabra *et al.*, 2007) and nursing (Pothier *et al.*, 2005) literature that verbal handovers are not as effective as written handovers. In a simulated setting, Bhabra *et al.* (2007) found that after 5 consecutive handover cycles, only 2.5% of patient information was retained by the medical doctors using a verbal-only handover method. Similarly, Pothier *et al.* (2005) found that after three cycles of handover, all information was lost in the nursing handover. On the other hand, Bhabra *et al.* (2007) found that there was a 85.5% retention rate with note taking and a 99% retention rate when using a printed handover sheet.

Ineffective handover can lead to multiple problems impacting on patient care and staff satisfaction. It has been shown that ineffective handover can lead to wrong treatments (Priest and Holmberg, 2000), delays in medical diagnoses (Pronovost *et al.*, 2002), life threatening adverse events (Bulau, 1992), incorrect medications and prescriptions (Arora *et al.*, 2007), patient complaints (Bark *et al.*, 1994), increased health care expenditure and hospital length of stay (Zwarenstein and Bryant, 2000) as well as other negative impacts for both the patient and the healthcare system (Petersen *et al.*, 1994). More importantly, ineffective and inadequate handover increases the risk of medico-legal claims (Singh *et al.*, 2007), decreases the preparedness of medical staff taking over the shift (Borowitz *et al.*, 2008) and is associated with errors and mistakes made by medical staff (Jagsi *et al.*, 2005).

From the medical doctors' perspectives, clinical handover is seen as a major contributing factor to medical errors and mistakes. A survey study was conducted in the United States (US) in 2005 regarding trainees' experiences with adverse events, mistakes and near misses. It was found that 15% of medical errors were associated with clinical handovers (Jagsi *et al.*, 2005). Some of these errors led to adverse events and malpractice claims. In the investigation of US malpractice claims conducted over 10 years, it was found that clinical handovers were amongst the most common causes of malpractice claims and this is especially so amongst junior staff and trainees (Singh *et al.*, 2007). In fact, 19% of malpractice claims involving trainees and 13% of malpractice claims involving non-trainees were related to clinical handover (Singh *et al.*, 2007). More importantly, clinical handover is the most important factor in determining the perception of preparedness among staff taking over the care of patients (Borowitz *et al.*, 2008). This research team from the US used a prospective confidential survey to investigate the effectiveness of the handover process between residents on the paediatric ward. They found that 31% of residents indicated that something happened while they were on call that they were not adequately prepared for. In most cases, residents did not receive information during handover which would have been helpful and most importantly, these instances could have been anticipated. Significantly, the only variable which was found to affect the perception of preparedness for the night shift was the quality of handover received (Borowitz *et al.*, 2008).

In summary, there is an increasing awareness that clinical handover is important for patient care and it is especially important within the current context of clinical practice to reduce the working hours of healthcare professionals.

2.3.3 Factors affecting clinical handover

Factors affecting clinical handover have not been clearly identified or studied despite the fact that the outcomes of poor clinical handover have been clearly documented (see Section 2.5.2). It is also interesting to note that many interventions to improve clinical handover have been documented without actually clearly identifying and addressing the factors which impact the efficiency and effectiveness of clinical handover. This prompted the Australian Council on Quality and Safety in Health Care to commission a literature review in 2005 with the aim of investigating factors which impact on clinical handover. This literature review report adapted Priest and Holmberg (2000)'s classification of systemic, organisational and individual factors and will be discussed below.

2.3.3.1 System design factors

The Australian Council for Safety and Quality in Health Care identified system design factors as one of the factors affecting clinical handover with seventeen articles thought to be related to system design factors. Handover is described in the context of complex healthcare delivery requiring well formed policies, procedures, legislations and supervision for it to function properly (Priest and Holmberg, 2000). The systemic design factors which have been reported to have an impact on clinical handover include education and training in regard to communication (Shrake *et al.*, 1994), specialist roles to assist communication (Litzinger and Rohde Boehler, 1997), structures to assist joint clinical decision making (Zwarenstein and Bryant, 2000), documented care planning processes (Menke *et al.*, 2001) and medication management (Schlienger *et al.*, 1999). Cahill (1998) and Howell (1994) examined the issues affecting bedside clinical handover. Cahill (1998) used unstructured interviews with the aim of developing an understanding of the patient's perceptions of handover and found that patients preferred to maintain a professional distance and the impact of bedside clinical handover on patient safety is debatable. While bedside handover might encourage patient participation, confidentiality is perceived as a major issue (Howell, 1994). Bedside handover was found to create more anxiety and confusion in the patients when medical jargon was used (Cahill, 1998).

There appears to be some confusion about clinical handover as well as the classification of factors which impact on the efficiency and effectiveness of clinical handover from the Council's literature review report. Many of the examples described in the literature review in this section do not involve the transfer of responsibility and accountability (Menke *et al.*, 2001, Zwarenstein and Bryant, 2000, Schlienger *et al.*, 1999, Litzinger and Rohde Boehler, 1997, Shrake *et al.*, 1994). The processes described in these publications were more about documentation, care plans and communication. It is uncertain as to how the examples described relate to system design. While bedside clinical handover is now recognised as being increasingly valuable, the inclusion of this in systems design is also questionable.

It is important to note that while the literature reports on system design factors which impact on clinical handover, many of these factors might not be related to clinical handover and their impact on the effectiveness and efficiency of clinical handover has not been clearly established.

2.3.3.2 Organisational cultural factors

The Australian Council for Safety and Quality in Health Care identified organisational factors which impact on clinical handover. The Council indicated in this category that poor communication results in poor patient outcomes. The literature review report identified three papers which identified organisational cultural factors as impacting on clinical handover. McKnight *et al.* (2001) authored a paper which examined communication needs and information sharing for physicians and nurses in a hospital setting and found that physicians and nurses had different information needs and preferred receiving information in different ways. This paper also highlighted that there were significant difficulties in providing adequate information to meet clinical needs. Canatsey *et al.* (1994) described a case study of a psychological patient with an adverse event and the main issue raised was the impact of a written care plan. Patterson *et al.* (1995) described the information needs for nursing handover from the perspective of the nurses.

It should be noted that these publications describe information transfer rather than clinical handover and while the literature review report classified these as organisational cultural factors it is unclear as to how these impact on clinical handover.

2.3.3.3 Individual factors

The Australian Council for Safety and Quality in Health Care identified individual factors which impact on clinical handover - inaccurate assessment (Beach *et al.*, 2003, Priest and Holmberg, 2000), incomplete information transfer during peri-operative handover (Anwari, 2002) and physical and mental status of doctors involved in prescription errors (Dean *et al.*, 2002).

While the factors identified might be important in patient safety, their role specifically in impacting on clinical handover is uncertain. From the above four papers reviewed, only Anwari (2002) discussed incomplete transfer of information during handover between medical to nursing staff within the peri-operative service environment. While the physical and mental status of the doctors may be important in handover, the paper reviewed actually attempted to investigate factors associated with prescribing errors (Dean *et al.*, 2002). Beach *et al.* (2003) and Priest and Holmberg (2000) on the other hand describe case studies whereby inaccurate diagnosis and assessment impact on patient outcomes. It is important to note from the above that individual factors which impact on clinical handover have not been clearly identified.

Subsequent to the Council's literature review report in 2005, there has been a significant increase in clinical handover literature. Wong *et al.* (2008) conducted a review of 112 publications and found that there were very few publications which investigated the factors impacting on the efficiency and effectiveness of clinical handover. This is problematic as interventions aimed at clinical handover are unlikely to make a significant impact given the lack of understanding of the factors which impact on clinical handover.

It is also important to note that despite the increasing volume of literature in clinical handover, clinical handover remains poorly defined as many publications seem to discuss it in relation to

communication and the transfer of information rather than the transfer of responsibility and accountability.

Further to this, the identification and classification of factors which impact on clinical handover seem to be driven by multiple case reports in the literature rather than from a research perspective. Therefore, it is very important that the definition of clinical handover and the factors that impact on clinical handover be clearly identified prior to consideration of interventions and improvement process.

2.3.4 Efforts aimed at improving clinical handover

There have been many efforts made to improve clinical handover and a lot of these clinical handover improvement efforts started after 2006 with the Australian Commission for Safety and Quality in Health Care project. This section focuses on a review of the interventions relevant to this thesis which include minimum data sets and information management in clinical handover, standardised operating protocols for clinical handover, education and training in clinical handover and electronic tools in clinical handover.

2.3.4.1 Minimum data sets and information management

Many attempts have been made over the years to identify common data elements for all clinical handover sessions. Through these efforts, various mnemonics and minimal data sets have been proposed in order to standardise the transfer of information at clinical handover. It should be noted however that despite the widespread use of some of these mnemonics, there is currently no evidence to demonstrate the superiority of one minimal data set over another.

Different methods have been suggested in order to derive and utilise the minimum data sets developed in clinical handover. Some have advocated the use of page long handover sheets (Alem *et al.*, 2008) while others have suggested the use of a simple presentation sequence (Mikos, 2007). Minimal data sets for clinical handover serve different purposes in different scenarios. They are used in shift-to-shift handover (McCann *et al.*, 2007), ambulance to emergency department transfer (Talbot and Bleetman, 2007), hospital to community discharge as a checklist (Halasyamani *et al.*, 2006), as part of a care plan (Fenton, 2006) or within an electronic tool (Wong *et al.*, 2007).

There are many minimal data sets and information management strategies described in the literature and a comprehensive review of this is provided by Wong *et al.* (2008). In this thesis, a review of the literature pertaining to a minimal data set for medical shift-to-shift handover implemented in clinical practice is presented below.

The most commonly used minimal data set for clinical handover is SBAR – situation, background, assessment, recommendations (Haig *et al.*, 2006). This structured communication algorithm has been popularised and supported by Kaiser Permanente in the US and has been recommended for use by the US Joint Commission in Quality and Safety in Health Care (Australian Commission on Safety and Quality in Health Care, 2010). Mikos (2007) presents an example of the implementation and evaluation of the SBAR technique within the health setting. The research team implemented the SBAR technique in a US hospital and reported improvements in the safety and quality of patient care (Mikos, 2007). More specifically, there was a 70% reduction in

reporting time during handover, a reduction in patient response time and a reduction in fall rates for patients (Mikos, 2007). Many variations of SBAR have been created and implemented across different healthcare systems and reported improvements in clinical handover, such as ISBAR (Australian Commission on Safety and Quality in Health Care, 2010) and ISOBAR (Porteous *et al.*, 2009, Yee *et al.*, 2009).

Another minimum data set developed by a group of researchers in New Zealand to assist with shift-to-shift medical handover is JUMP – jobs outstanding, unseen patients, medical contacts and patients to be aware of (McCann *et al.*, 2007). McCann *et al.* (2007) however did not describe the implementation process or the evaluation of this tool.

A group of researchers in the UK trialled a standardised weekend minimal data set which consisted of a long list of documentation for each patient (Grainge *et al.*, 2005). While it was found that this improved the documentation of handover, it did not lead to improvements in the weekend reviews or documentation of discharge planning and discharge dates (Grainge *et al.*, 2005).

A group of researchers in the US trialled a handover card at the Mayo clinic (Lee *et al.*, 1996). The handover card consisted of a wide range of information fields about each patient and it was reported that there was significant improvements in the quality of handover as well as user satisfaction (Lee *et al.*, 1996).

There are other minimal data sets, especially those used in nursing handover which have been reviewed by Wong *et al.* (2008). As this thesis focuses on shift-to-shift clinical handover amongst clinicians, the review of the literature is limited to shift-to-shift medical handover. While the minimum data set is the most commonly reported intervention to improve clinical handover, the impact on clinical handover is evaluated based on improvements in information transfer. The impact of the minimum data set on the transfer of responsibility and accountability has not been clearly evaluated.

2.3.4.2 Standardised Operating Protocols

Standardisation has been proposed as one of the key principles to improve quality and safety in healthcare. The assumption is that a standardised process is a defined process which is repeatable. As such, standardised operating protocols have been one of the interventions proposed to improve clinical handover (Singer and Dean, 2006). There are only a few published standardised operating protocols in the literature and majority of these protocols are applicable to nursing handovers.

Bourne (2000) proposed a standardised operating protocol for nursing handover. However, there was little information provided on how the standardised operating protocol was developed, implemented and evaluated.

Benson *et al.* (2007) presented a detailed standardised operating protocol for nursing handover based on a literature review, quantitative surveys and discussion forums. Benson *et al.* (2007) described eleven principles of nursing shift-to-shift handover which covered many aspects of handover including legal requirements, organisation, practice standards, confidentiality,

timeliness, continuity, verification, safety, team member dynamics and patient involvement. There was however no discussion of implementation or evaluation of this standardised operating protocol.

Alvarado *et al.* (2006) provided a more complete description of a clinical handover improvement project from development to implementation and evaluation of a standardised operating protocol. The project developed evidence-based guidelines for the transfer of accountability and a bedside patient safety checklist for nurses (Alvarado *et al.*, 2006). Alvarado *et al.* (2006) clearly described the process and guiding principles for change management for the implementation of the standardised operating protocol. The evaluation of the program was ongoing and not completed at the time of publication (Alvarado *et al.*, 2006).

The examples above all relate to nursing handover. There were very few publications which discussed the utilisation of a standardised operating protocol to improve medical handovers. Using the concept of a hand-off clinic, a team of US researchers describe using interactive workshops to identify and develop standardised processes for handover (Arora and Johnson, 2006). The authors clearly describe the implementation process which included education and training as well as an evaluation of the program (Arora and Johnson, 2006). A team of UK researchers describe the innovative use of an idea from the aviation industry and the Formula 1 pit-stop model to design and develop a new clinical handover standardised operating protocol for paediatric surgery to paediatric intensive care unit handover (Catchpole *et al.*, 2007). The protocol includes four steps and eleven safety themes (Catchpole *et al.*, 2007). Evaluation of the new protocol showed significant improvements in technical errors and team work, as well as improvements in information transfer and a reduction in the duration of handover (Catchpole *et al.*, 2007).

While standardised operating protocols have been used to improve clinical handover, the role of standardised operating protocols as part of a clinical handover improvement process has not been described. This is especially important when an electronic clinical handover tool is being implemented as part of the clinical handover improvement process as the standardised operating protocol must take into account the complexity of electronic tools.

2.3.4.3 Education and Training

While it appears that education and training is vital in improving clinical handover, there is very little literature available that reports on education and training in clinical handover, or the impact of education and training on clinical handover improvement.

Hoban (2003) describes the need to provide education and training for nursing handover through a five step communication model for face to face, written or recorded handover. These five steps include avoidance of jargon and abbreviations, provision of relevant individual information, provision of relevant notes, promotion of accuracy of handover and promotion of patient confidentiality. However, this is purely a personal opinion not backed up by any research data (Hoban, 2003).

Horwitz *et al.* (2007) describe the development of a curriculum to teach medical staff verbal handover skills and describes the implementation of this curriculum in three US hospitals. The

evaluation results were restricted only to medical students who reported an increased confidence in clinical handover skills. Clinicians were not included in the evaluation (Horwitz *et al.*, 2007).

It is important to note that the education and training process described in these papers consider education and training as an independent intervention. The literature has not provided any insight in regard to the combination of multiple interventions, in which education and training is part of a bigger picture to improve clinical handover. Yee *et al.* (2006) describe through their research study, the use of education and training through feedback and reflective learning for junior medical officers within the broader strategic plans for clinical handover improvement. They argue the importance of education and training as part of a systemic change in order to engage junior doctors for clinical handover improvement (Yee *et al.*, 2006).

2.3.4.4 Electronic Tools

Electronic tools have been viewed as the panacea for many problems in healthcare and clinical handover is no different. Electronic tools have been suggested as a means of improving the efficiency and effectiveness of clinical handover (Cheah *et al.*, 2005, Solet *et al.*, 2005, Van Eaton *et al.*, 2005, Petersen *et al.*, 1998). There have been several reports of electronic tools which have been developed, implemented and evaluated in the healthcare setting and this section examines these in greater detail.

Some electronic tools for clinical handover improvement were designed as standalone systems (Chacko *et al.*, 2006, Morrison, 2006) while others were designed within the current electronic medical record or electronic health systems (Cheah *et al.*, 2005, Morris and Baker, 2005). Some electronic tools developed were only described very briefly. An example of this is iHandover (Morrison, 2006) which is a standalone electronic clinical handover system developed by junior doctors in Australia. Interviews and group discussions were utilised to obtain the system requirements and an evaluation of the system found that 66% of respondents perceived that the new system resulted in improved handover (Morrison, 2006). Unfortunately, there was very little detail about iHandover which could assist in the understanding of the design, implementation and evaluation process. Chacko *et al.* (2006) also describe an electronic tool called eHand-offs which was developed by IBM, Lotus and Domino. eHand-offs was designed for electronic patient sign-outs at US hospitals. While the paper claims that the tool helps to improve the continuity of patient care, reduce medical errors and improve resident supervision and training (Chacko *et al.*, 2006), there was little detail provided in the study to assist clinicians who were considering utilising an electronic tool.

Some electronic clinical handover tools were developed within existing clinical information systems. For example, an electronic clinical handover module was developed within an existing clinical information system utilised by three hospitals in South Australia (Morris and Baker, 2005). The authors describe the development of the module including systems design and functionality and the design of the pilot study but do not describe the implementation process or evaluation of the module (Morris and Baker, 2005). There is little detail addressing the design principles, implementation process or outcomes to assist others in future electronic clinical handover tool development.

Other case studies involving electronic clinical handover tools which were better documented in the literature include an Australian case study which describes the development of a minimal data set and the incorporation of that minimal data set into an existing electronic system at a Australian hospital (Cheah *et al.*, 2005). This electronic clinical handover tool contained information directly extracted from existing clinical handover systems and allowed for some free text entry by the users (Cheah *et al.*, 2005). The study then evaluated the electronic tool quantitatively through the use of surveys and found that the electronic tool provided adequate information about patient details but was deficient in the free text entries. Handback was only completed in about 50% of the patients with significant events (Cheah *et al.*, 2005). The evaluation of this electronic tool as reported by the authors emphasises the functionality of the tool which includes information exchange and information flows but does not discuss the wider impact of the tool.

Some concerns raised about electronic clinical handover tools include the lack of mobility. A group of researchers in Scotland designed and implemented a mobile handheld device to assist in handover (McGee-Lennon *et al.*, 2007). McGee-Lennon *et al.* (2007) describe the implementation of a handheld computer system for nursing handover in three Scottish hospitals' emergency care teams. They also reported on the evaluation of the electronic tool from the perspective of user acceptance. While staff found the system easy to use and useful for information sharing, the need for additional time for data entry was a significant issue. Battery life and screen sensitivity were also factors limiting the use of the handheld device.

Clinicians have a tendency to focus on clinical outcomes in evaluating any interventions and randomised controlled trials are commonly seen as the gold standard. Petersen (1998) and van Eaton (2004) have attempted to evaluate clinical outcomes after the implementation of electronic clinical handover tools and van Eaton *et al.* (2005) has utilised randomised controlled trials as the evaluation method. These three research papers are reviewed below.

Petersen *et al.* (1998) reported on the evaluation of a four month computerised handover program for shift-to-shift medical handover to improve continuity of care. The team focused on adverse events and patient outcomes as the main intervention measure and found that there was a significant reduction in adverse events after the intervention from 3.9% to 2.4% (Petersen *et al.*, 1998). However, the reduction in preventable adverse events from 1.7% to 1.2% did not reach statistical significance (Petersen *et al.*, 1998). The program was well liked by the users and they continued to use the program after the trial period (Petersen *et al.*, 1998). The build process was not described. The study showed that it is difficult to obtain adequate data to show a significant difference in patient outcomes from the use of an electronic clinical handover program. It also demonstrated the importance of ensuring that user satisfaction is part of the evaluation. While user satisfaction was not one of the main evaluation criteria in this study, it was one of the most important factors in ensuring long term sustainability of the intervention (Petersen *et al.*, 1998).

Van Eaton *et al.* (2004) and van Eaton *et al.* (2005) generated significant insights in the design, implementation and evaluation of electronic clinical handover tools. They described a multi-step method to the design and implementation of an electronic system to improve shift-to-shift handover amongst junior staff using some information that was retrieved from existing clinical

information systems and other information manually entered by residents. The system was widely utilised by residents for handover but an evaluation based on user perception was not conducted (Van Eaton *et al.*, 2005, Van Eaton *et al.*, 2004).

Van Eaton *et al.* (2005) conducted a prospective randomised cross-over study to evaluate the impact of the system on the continuity of patient care. This study found that a computerised system improved information transfer and reduced the time taken for ward rounds (Van Eaton *et al.*, 2005). The quality of handover improved and it was found that the electronic system shortened the time taken for ward rounds by 1.5 minutes per patient (Van Eaton *et al.*, 2005). To the researcher's knowledge, this is the only randomised trial for interventions undertaken to improve clinical handover. While these two studies stated that there was improvement in patient care, the improvement was measured through a surrogate marker – information transfer. The problematic assumption here is that good information transfer will axiomatically lead to improved patient care. While user satisfaction was noted in the studies, it was not formally studied or documented. Also, this paper did not identify problems which might arise from the implementation of an electronic clinical handover system.

While the literature has reported a few studies which investigated the use of electronic clinical handover tools in the healthcare sector as reviewed above, these systems have been developed to automate existing clinical handover processes in order to improve their efficiency and effectiveness. Many of these studies also did not report on the design, implementation and evaluation process and while some studies reported a good level of user satisfaction, the perception of users was not evaluated in many studies.

The research presented in this thesis aims to address the deficiencies identified above. Turner *et al.* (2006) describe the need to utilise a user-centred approach in the design and implementation of an electronic clinical handover support tool and the unique insights obtained through user engagement in clinical handover improvement. Wong *et al.* (2007) describe the approach to design and difficulties in engaging with the clinicians in the design process. Wong *et al.* (2007) also describe the six safety features incorporated into the electronic clinical handover support tool to assist in clinical handover improvement.

2.4 User-centred approaches

“User-centred” approaches and “human-centred” approaches have a long standing tradition in information systems (IS). Although a distinction can be made between the two (Gasson, 2003), this research will treat the two terms as synonymous. Within the healthcare context, user-centred approaches have been increasingly utilised which will be discussed in detail below. Different methodological approaches have also been proposed to assist with user-involvement. This section aims to provide an overview of the origins of user-centredness and user-centred approaches which then provides the background to the user-centred approach used in this research.

2.4.1 User-centredness

The origin of user-centredness and user-centred research is a topic of much debate. Within information systems and information science research, a more holistic user-centred research and the concept of user-centredness has been attributed by some to Dervin and Nilan (1986). Others

however attribute that paradigm shift to much earlier work. Donald Case in his book traced the origin back to the 1970's, especially to the interesting article which challenged the assumptions of information research which dominated research on information needs and information behaviour (Case, 2002). Other scholars such as Bates offered a different view point, by suggesting that the origin of user-centred research probably extended further to the 1950's (Bates, 2004). This view is debatable as earlier work mainly focused on information artefacts, the source and venue of the information artefact rather than the user as such. While the main research area of Dervin and Nilan is in the field of public library utilisation (Dervin and Nilan, 1986), the conceptual understanding and argument by their paper in regard to users and user-centred approach is very influential and still very applicable to health information systems research today. A detailed analysis of the conceptualisation, context and environment of Dervin and Nilan's review is presented by Talja and Hartel (2007.).

Dervin and Nilan (1986) discussed seven characteristics of user-centredness. These seven characteristics have created a paradigm shift from traditional information science and information systems research to user-centred research.

- *Subjectivity*: User-centred research focuses on information as a constructed reality through life-experiences of the user rather than the "objective" information which pretends to represent reality.
- *Constructivist, active user*: User-centred research considers users as active participants in determining the usefulness of information and defining needs continually.
- *Situationality*: User-centred research considers the needs of users as situational and therefore the system needs to make repetitive needs assessments to adjust to user requirements.
- *Holistic views of experience*: User-centred research should consider issues outside user interactions with the system.
- *Internal cognition for information needs*: User-centred research should consider information needs as internal, psychological and dependent on cognitive states.
- *Individuality*: User-centred research considers each individual to have the right to be different.
- *Qualitative research*: Inductive qualitative research methodology is suggested as an important research methodology in user-centred research.

While these seven characteristics of user-centred research were proposed in the 1980s and involved mainly public library users and information systems research (Dervin and Nilan, 1986), these characteristics are very relevant to research conducted in a health care setting. There are many similarities in the understanding of user-centredness and user engagement in ICT development in healthcare. It is however important to note that the argument presented by Dervin and Nilan (1986) is information focussed and not technology focussed.

2.4.2 Adoption of user-centred approaches in healthcare

The adoption of user-centred approaches has been suggested to be extremely valuable in the development and implementation of ICTs in healthcare. While it is suggested in the literature that this is important and various methods are described to involve users in the process, it is important to understand the rationales behind user-centredness and the objectives of adopting a user-centred approach. This section revisits the proposed benefits of adopting a user-centred approach highlighted in the literature. There are various ways to involve users in adopting a user-centred approach ranging from descriptions of user-experiences to involving them in the design, development and implementation process. The focus of this literature review is on hospital information systems and healthcare professionals, with a focus on clinicians as users. The researcher has broadly classified users into two levels, passive and active, which will be discussed in Section 2.4.3 :

- *Passive*: Users are asked for their opinions about a system that has already been designed.
- *Active*: Users are involved in the pre-conception, design and implementation process.

2.4.2.1 Benefits

The adoption of user-centred approaches can be beneficial to both users and systems as a whole. Several reasons have been described in the literature supporting the use of a user-centred approach for ICT development in healthcare. The reasons for involving users in ICT development include:

- It provides an understanding of the healthcare professionals' understanding and attitudes towards technology in general and therefore is better able to assist in the transition process to new technology (Thielst and Gardner, 2008).
- It generates significant insights into the context of healthcare delivery (Wong *et al.*, 2007, Turner *et al.*, 2006).
- It provides an opportunity to understand and extract user requirements and information requirements for clinical tasks (Elf *et al.*, 2007, Wong *et al.*, 2007).
- It provides an understanding of motivators and barriers for ICT implementation (Kyhllback and Sutter, 2007, Johnson *et al.*, 2005).
- It improves the functionalities of the ICT developed and leads to improved usability and user acceptance (Weber-Jahnke and Price, 2007).

It is interesting to note that while various studies adopting user-centred approaches have been reported (Shah and Robinson, 2006), many of these studies concentrate on understanding the methodology and involve users towards the end of the development cycle. The objectives of involving the user might be well understood but the rationale behind involving the users are not explicitly stated (Shah and Robinson, 2006).

2.4.2.2 Challenges

There have been reports of challenges faced in adopting a user-centred approach. The healthcare sector seems to have lagged behind in regard to user engagement and involving users in the design, development and implementation of technology for healthcare delivery (de Rouck *et al.*, 2008). The first challenge is the involvement of field experts. The integration of a usability approach in healthcare IT design, for example is not an easy process as it needs to involve experienced experts in the field of human factors (Gruchmann and Borgent, 2007). Secondly, clinicians often find it difficult to articulate what they require in order to perform their job (Wong *et al.*, 2007, Wears and Berg, 2005). Further to that, the users within the healthcare system are not a homogenous group. Different users have different information technology (IT) requirements (Chaudhry *et al.*, 2006). While it has been mentioned that user-centred approaches must ensure the needs of all users are met, this is often very difficult to achieve. Finally, the healthcare literacy of users range from novice users to experienced users. Therefore is difficult to balance the needs of users requesting for different levels of technology.

2.4.3 Levels of user involvement

Users can be involved at different levels in the development and implementation of ICTs in healthcare. The researcher has classified user involvement into two levels – passive and active.

2.4.3.1 Involvement at a passive level

Many studies describe users' experiences, attitudes and acceptance towards ICT implementation in healthcare. These studies focus on the perceptions of the users after the implementation of ICTs. Many of these studies reveal mixed results. For example, electronic health records have been described as one of the most important steps to be taken in order to improve quality and safety in healthcare (Corrigan *et al.*, 2002, Committee on Quality of Health Care in America - Institute of Medicine, 2001). Despite advances in the last decade and multiple different studies into the impact of electronic health records in regard to user perceived outcomes, there have been mixed results. This is demonstrated in a systemic analysis conducted by Delpierre *et al.* (2004). The systemic review evaluated a total of twenty-six articles. Users are generally happy with the utilisation of EHR. When specifically analysing for user perception as outcomes in regard to medical practice and guidelines, however, positive experiences were as frequent as negative experiences (Delpierre *et al.*, 2004). The authors concluded that many factors need to be considered in studies where users are involved at a passive level.

This important point is further demonstrated by two studies which investigate the perception of nurses in regard to electronic health records. In a study using questionnaires, interviews and observations, it was shown that nurses from two community hospitals felt that electronic health records hindered nursing work through increased documentation, reduced communication and reduced critical thinking (Kossman, 2006). In a different study, nurses were asked through a questionnaire study in regard to their opinion of providing care using electronic health records (Dahm and Wadensten, 2008). They found that nurses had good perceptions of the impact of electronic health records. It is important to note this study asked specifically about the standardised care plan using electronic health records (Dahm and Wadensten, 2008). Many other studies with regard to electronic health records have reported conflicting results (Bloom and

Hungtington, 2010, Chisolm *et al.*, 2010, Holden, 2010, Hackl *et al.*, 2009, Simon *et al.*, 2008, Simon *et al.*, 2007, Dansky *et al.*, 1999).

It is important to note that the above studies have utilised different methodologies and focused on different aspects of the electronic health record. Different organisational and implementation issues also impact on the users' perceptions and attitudes towards the electronic tool (Holden, 2010). Personal experience and emotions also impact on the outcomes of the study (Hackl *et al.*, 2009). User feedback is subjective and can be difficult to incorporate into IT design. It is also important to note that clinical work is not as straightforward as it seems. A study of medical secretaries found that the work they do is more complex than anticipated (Bertelsen and Nøhr, 2006). Changes to one part of the work practice through the electronic health record might therefore not produce correlated changes in the outcomes of medical care. More importantly, the feedback obtained through the users might not help with improving electronic health records as workarounds might have already been developed to help with the workflow.

There is therefore compelling evidence to identify factors which assist in ensuring and maintaining positive attitudes in users to assist in future design and implementation activities (Simon *et al.*, 2007). As a "passive user" cannot provide adequate involvement for design and implementation, other studies have emerged which engage users in this process. This is further discussed below.

2.4.3.2 Involvement at an active level: User-centred design (UCD)

Users at the active level participate through providing understanding of work processes, development and implementation of ICTs in healthcare. Various methodologies have been described in UCD. The increasing attention in the IT/IS literature to user-centredness has led to the development of ISO 13407 standards for the human-centred design of interactive systems (ISO 13407, 1999). This is further discussed below.

User-centred design is a design framework which involves users at every stage of the system development life cycle of IT design (ISO 13407, 1999). UCD is guided by four important principles. These four principles are:

1. There needs to be an appropriate allocation of functions between user and technology;
2. Users are engaged and involved in the design and continuous testing from the beginning;
3. The process is one of iterative design process, taking user feedback into consideration; and
4. Multidisciplinary and cooperative design can be integrated dependent on the specific context.

The first principle of appropriate allocation of function between users and technology is absolutely crucial in UCD (ISO 13407, 1999). During the design phase, it is very important to decide which processes should be automated and which processes are dependent on user performance. This needs to take into account the functions that the technology is performing and the capability, IT literacy and socio-cultural context (ISO 13407, 1999). Berg (2003) has

emphasised that users and technology have clearly allocated tasks and users have the time and resources to adapt to the IT tool.

The second principle of a UCD approach suggests early identification, involvement and engagement of users in the process (ISO 13407, 1999). Within healthcare, it is especially important to identify who are the real users in the process. Therefore, observing real or potential users is important in ICT design. Several research methods have been suggested to help identify users and obtain user insights. These methods include interviews, observations and questionnaires (Hackos and Redish, 1998), cultural probes (Gaver *et al.*, 1999), artefact analyses (Beyer and Holzblatt, 1998) or utilisation of multiple different methods (Beyer and Holzblatt, 1998). In addition, users should be involved in usability testing continuously throughout the design process (ISO 13407, 1999). Different usability testing processes were described in detail by Nielsen (1993) and the importance of taking context into account when performing usability testing.

The third principle is the need for an iterative design process (ISO 13407, 1999). The ISO 13407 standard describes a clear model for iterative design, incorporating the following:

1. User context
2. User and organizational requirements
3. Produce solution
4. Evaluate the design against requirements.

By using this method, it is hoped that the system developed will meet the requirements from a user's perspective.

Finally, the fourth principle is multidisciplinary and cooperative design when the context is appropriate (ISO 13407, 1999). Healthcare delivery often involves multiple different teams of professionals. It is therefore not only important that users and designers work cooperatively but also that other experts are involved when necessary.

2.4.3.2.1 Involvement of active users at the pre-conception phase

Some studies have described using various approaches to involve users in the process of understanding clinical problems and the process of information flow with the pre-conception that this understanding will lead to the development of an electronic clinical information system. Different techniques have been utilised and these are described below.

Elf *et al.* (2007) applied workshops and interview methods in order to understand the care of patients with stroke. This is a group modelling approach and involved a multi-professional group which is important in stroke care. This study created a new conceptual model of the physical design of the stroke unit, the way that stroke care is provided and a joint understanding of the clinical process (Elf *et al.*, 2007). This assisted in the process of IT design.

In a different study, a team utilised an information needs approach to understand the information requirements to support clinicians by automatically generating disease-specific

literature and information for a particular patient (Braun *et al.*, 2004). The expectation through this study was the ability to obtain and retrieve adequate but specific information to assist clinicians through engaging clinicians in the process (Braun *et al.*, 2005). The results, however, showed that the amount of information needs were high and not easily manageable or almost unmanageable unless further restricted by focusing on one type of knowledge in order to make the information needs useful (Braun *et al.*, 2007).

Nøhr and Botin (2007) used video observations to understand work practices. While this could be a very useful method, it is very time and resource intensive.

2.4.3.2.2 Involvement of active users at the design phase

Various methodologies have been proposed to involve users in the design phase. The most commonly described methodologies are human factors engineering and participatory design. Other methods of UCD are summarised by Livari and Livari (2011).

Human factors engineering has been proposed by some researchers to be a very useful tool for designing IT applications (Beuscart-Zephir *et al.*, 2010). An introduction to the methodology is provided by Beuscart-Zephir *et al.* (2006). An example of human factors engineering in engaging users to design an IT tool is presented by Beuscart-Zephir and Nøhr (2009). This project, known as PSIP (Patient Safety through Intelligent Procedures in medication) used human factors engineering methods throughout the project lifecycle to improve identification and prevention of adverse drug events (Beuscart-Zephir and Nøhr, 2009). Beuscart-Zephir *et al.* (2007) provided a review of human factors engineering in biomedical projects. This review suggested that human factors engineering and usability testing be utilised in most IT system development projects in order to obtain true user engagement (Beuscart-Zephir *et al.*, 2007).

Participatory design originated in Scandinavia and was initially used in other industries to design equipment and tools as well as roads and buildings. For example, participatory design was used to design an improved version of a police patrol car to reduce the incidence of back pain (Kuorijnka *et al.*, 1994). Within the healthcare sector, the use of participatory design to assist in the design of various equipments is evident. By involving carers in a participatory design manner, a group of researchers at Pittsburgh produced a prototype of a wheelchair convoy system which assisted with the movement of disabled individuals by their carers (Sharma *et al.*, 2008). Participatory design has also been used to develop IT systems in healthcare. There are various ways of utilising participatory design, such as the MUST method. The MUST method has been described in great detail (Kensing *et al.*, 2007) and it has been shown to be useful in the development of IT to support shared care for pregnant women.

Participatory design can also be combined with other methods and to engage a team of multidisciplinary professionals to develop an IT system that supports their individual needs to collaboratively deliver care for patients. Kuziemy *et al.* (2008) showed that by using a grounded-theory-participatory design approach, it was possible to engage and obtain insights from professionals from different disciplines to work towards a computer-based information tool to support both the day-to-day case management and education of severe pain management for palliative care. Participatory design has also been used to engage patients as users for chronic disease management. Using participatory design, the MaXi project has involved patients as users

in order to design artefacts which might help with day-to-day self-management of diabetic patients (Nøhr et al., 2009). It is however important to note that participatory design of information systems in healthcare is often guided by the social environment in which participants work (Sjoberg and Timpka, 1998). The design phase has to take existing social constraints and norms into account (Sjoberg and Timpka, 1998).

2.4.3.2.3 Involvement of active users in the implementation, revision and feedback phase

Users can be engaged to assist in the implementation of an IT system, either through the actual implementation of the system or through providing comments and feedback for revision of the system. This is an important step as the users' involvement in designing the IT system does not automatically lead to a system that fulfils their needs. In a multi-case study analysis of clinical information system implementation within three healthcare institutions, it was found that four main theory generation and practical implementation strategies guide the implementation process (Pare, 2002). These four propositions, i.e. pragmatism and anticipate problems, equifinality, rationality and complementarity which utilised user's skills, duality of structure with engaged users to reflect on their practice and implementation strategy and inderterminancy, which describe the unique life-cycle of each project, showed the importance of users in all these four steps (Pare, 2002). In a study which aimed to compare the successful implementation of an EMR in Sweden with the problematic implementation of an EMR in US, the authors concluded that not only do users need to be involved in the design, selection and modification of IT tools, they also had to be involved in the implementation and change management of the process (Ovretveit et al., 2007). Regular reviews and revision to the system based on user feedback is required, especially for less developed systems (Ovretveit et al., 2007). A practical example is demonstrated by the implementation of an obstetrics EMR module whereby it was found that involvement by clinicians in systems design did not guarantee that the system could be used without problems (Dagroso et al., 2007). In fact, the mandatory use of the system had to be suspended and users were then engaged in the revision process as well as the implementation and change management process in order to ensure clinician acceptance (Dagroso et al., 2007).

2.4.3.2.4 Involvement of active users throughout the entire process

Some studies involve and engage users through the entire process from pre-conception and design through to implementation and then revision and feedback.

The first example of user involvement in assisting in the understanding of workflow prior to the design of IT tools is presented in a series of papers describing a collaborative clinical trial protocol system (Weng et al., 2007, Gennari et al., 2005, Gennari et al., 2004, Weng et al., 2004, Weng et al., 2003). The group used multiple different methods, including prototype scenarios (Weng et al., 2003), ethnographic studies (Gennari et al., 2004), participatory design and iterative prototyping (Gennari et al., 2005), a combination of the above with semi-structured interviews and work artefact analysis (Weng et al., 2007) and finally the design and implementation of an IT system (Weng et al., 2004).

Firstly, the group described how they used prototype scenarios and cases to identify problems and understand the collaborative clinical trial protocol writing process. Due to the complexities of the clinical protocol writing process and the relative lack of prior research in this area, the group

conducted an ethnographic study to understand this clinical process better. The group demonstrated the collaborative needs of the processes of clinical protocol writing (Gennari *et al.*, 2004). Through understanding this process for IT development, the group found that collaboration amongst healthcare professionals faced barriers such as cultures, literacy, time schedule and they suggested technology as a solution (Gennari *et al.*, 2005). The research group then used participatory design and an iterative prototyping process to design a system to solve the current problem (Gennari *et al.*, 2005). The research group believed that through this process, the IT system developed could better fit clinician user requirements to support asynchronous communication (Gennari *et al.*, 2005). By combining the ethnographic study, semi-structured interviews and work artefact analysis, users were further involved in role-based advocacy and prototyping changes (Weng *et al.*, 2007). The team then further utilised users for usability evaluation prior to full implementation (Weng *et al.*, 2007). The IT system design was then described and the system was implemented (Weng *et al.*, 2004). It was important to note though that while the research group argued that the involvement of users in their project had enhanced the possible impact of the IT system implemented, there was no evaluation data presented to date.

The second example that has been described is a hybrid approach of combining grounded theory and participatory design has been described (Kuziemsky, 2010). The grounded theory-participatory design approach draws on the benefits from both methods by engaging users and understanding the conceptual framework of practice. As a practical example, this approach was used to code for ontology development, using grounded theory analysis, for palliative care severe pain management. The information obtained was then used to design a computer based tool in order to improve care (Kuziemsky *et al.*, 2007). This tool was then tested using usability testing and it tested favourably in a laboratory condition (Kuziemsky *et al.*, 2008). This approach is later described as a four-step approach for ontology-based information system design (Kuziemsky and Lau, 2010).

The use of grounded theory analysis in order to obtain user requirements as well as contextual insights has also been described elsewhere (Wong *et al.*, 2007). These insights were then used to develop an electronic tool to support clinical handover improvement (Wong *et al.*, 2007).

2.5 Clinical handover literature review post data collection

This section provides a comprehensive review of the literature that was published post data collection. There had been an increasing amount of attention to clinical handover amongst researchers, clinicians and healthcare organisations as the Australian Commission on Safety and Quality in Health Care took on the role as the lead technical agency to develop clinical handover solutions for the World Health Organisation's patient safety initiatives in 2007. The researcher has since been involved in the Australian National Clinical Handover Project based on her experience in conducting research into clinical handover as described in this thesis.

Significant efforts have been made in Australia and internationally to develop a better understanding of clinical handover. There is now a new body of research and further publications to improve the understanding of clinical handover. The focus of this section is to provide a review of the body of literature from 2007 onwards which had not been reviewed in the previous section

to provide an update on the current understanding of clinical handover and to provide a basis for discussion in Chapter 9.

2.5.1 Definition of clinical handover

The definition of clinical handover which involves the transfer of responsibility and accountability has achieved widespread acceptance in research (Cohen and Hilligoss, 2010), practice (Jorm *et al.*, 2009) and legislation (Australian Commission on Safety and Quality in Health Care, 2010).

Cohen and Hilligoss (2010) provided a detailed discussion on the definition of clinical handover. They argued that while the definition of clinical handover had been proposed and accepted as the transfer of responsibility and accountability, there was a lack of discussion in regard to the scope of activities defined under the term of clinical handover (Cohen and Hilligoss, 2010). If the scope was too broad and included too many clinical activities, it would be too difficult to meaningfully investigate clinical handover (Cohen and Hilligoss, 2010). If the scope was too narrow, the impact of clinical handover research might not be ideal (Cohen and Hilligoss, 2010). The suggested definition continued to emphasise the transfer of responsibility of patient care (Cohen and Hilligoss, 2010). From a more practical perspective, Jorm *et al.* (2009) emphasised the need to focus on the transfer of responsibility and accountability. This emphasis guided the research projects funded by the Australian Commission on Safety and Quality in Health Care and the subsequent thirteen publications in relation to practical improvement of clinical handover in Australia (Belfrage *et al.*, 2009, Botti *et al.*, 2009, Clark *et al.*, 2009, Hatten-Masterson and Griffiths, 2009, Iedema *et al.*, 2009, Johnson and Barach, 2009, Porteous *et al.*, 2009, Quin *et al.*, 2009, Stead *et al.*, 2009, Wood *et al.*, 2009, Yee *et al.*, 2009). From a legislative perspective, the OSSIE guide has been endorsed as the national guideline for clinical handover improvement in Australia and a standard for clinical handover has been developed for all healthcare facilities in Australia (Australian Commission on Safety and Quality in Health Care, 2010).

It appears that there is a change in the focus of literature published from 2007 onwards with regard to understanding and defining clinical handover. The focus has shifted to the transfer of responsibility of patient care. While the emphasis on information transfer remains in some literature (Cohen and Hilligoss, 2010, Zavalkoff *et al.*, 2010), the objective of information transfer is to transfer the responsibility for patient care.

2.5.2 Context of clinical handover in quality and safety

Clinical handover has taken on an increasingly important role in quality and safety. The literature continues to recognise the importance of the clinical handover in preventing adverse events (Thompson *et al.*, 2011, Matic *et al.*, 2010, Zavalkoff *et al.*, 2010).

Clinical handover has also been more recently included in accreditation standards. The Joint Commission added “implement a standardised approach to hand-off communications, including an opportunity to ask and respond to questions” to its National Patient Safety Goals Requirement. In Australia, clinical handover has become one of the major domains for accreditation standards and the standard is currently being developed by the Australian Commission on Safety and Quality in Health Care (Australian Commission on Safety and Quality in Health Care, 2011).

The scope of clinical handover remains unclear with some including discharge summaries and radiology requests as part of clinical handover (Joint Commission, 2008, Moore *et al.*, 2007) while others specifically excluding these processes (Australian Commission on Safety and Quality in Health Care, 2011).

2.5.3 Factors which impact on handover

There is increasing literature which examines factors that impact on clinical handover. Cultural and educational factors are increasingly being recognized as essential factors which determine the practice of clinical handover (Catchpole *et al.*, 2010).

Catchpole *et al.* (2010) examined factors relating to patient handover with correlative practice in motor racing teams. Interview techniques were used to study healthcare professionals and motor racing managers. They found that proactive learning and post-hoc learning were important in motor racing and this was lacking in a clinical handover setting (Catchpole *et al.*, 2010). In addition, cultural issues such as historical working practice and poor awareness of handover protocols emerged as major themes from healthcare professionals which impact on handover (Catchpole *et al.*, 2010).

Horwitz *et al.* (2009) used audiotaped analysis of clinical handover sessions and found that five important factors determine the quality of handover sessions – familiarity with the patient, sense of responsibility for the patient, number of handovers, the presence of a senior leader and a comprehensive written handover. Some suggested improvement strategies included the use of templates, standardisation practices, invoking a sense of responsibility for patient care and the involvement of the patient's primary team at handover.

It appears that the literature post 2007 has started to focus on factors that might impact on the quality of clinical handover as well as recommend changes which might help to improve clinical handover. Catchpole *et al.* (2010) and Horwitz *et al.* (2009) have found that cultural and systemic factors are important in impacting on the effectiveness and efficiency of clinical handover.

2.5.4 Interventions aimed at improving clinical handover

There have been many interventions suggested for clinical handover improvement (seen Section 2.3.4) and it appears that publications from 2007 onwards have provided further evidence for these interventions to clinical handover improvement.

2.5.4.1 Minimum data sets and information management

Minimum data sets continue to attract attention as a way to improve communication and clinical handover.

There has been debate about minimum data sets and whether minimum data sets can be used universally (Australian Commission on Safety and Quality in Health Care, 2010). Mistry *et al.* (2010) demonstrated that the generation of a universal comprehensive minimum data set was possible. Data was collected through a 15-item questionnaire from 49 services within the hospital. The researcher found that many department specific handover data sets contained components of a comprehensive minimum data set. As such, by combining the data sets, it was possible to generate a universal minimum data set (Mistry *et al.*, 2010).

A recent study utilising a one-page information transfer tool has shown that the use of a simple tool in the paediatric post-cardiac surgery setting improved critical information transfer during handover (Zavalkoff *et al.*, 2010). An attempt was made to link improvement in information transfer to patient safety but the result did not statistically support that conclusion (Zavalkoff *et al.*, 2010).

A study in Australia, using a specific minimum data set, known as ISBAR during afterhours shift showed that there was improvement in the perception of handover communication (Thompson *et al.*, 2011). The improvement was felt by the sender and the receiver of the handover sessions (Thompson *et al.*, 2011).

It is important to note that the minimum data sets used in the published literature are really a variant of the SBAR technique. While there was no data to support the use of a particular minimum data set (Wong *et al.*, 2008), the World Health Organisation (World Health Organisation, 2007) and the Joint Commission in USA (Pillow, 2007) have both recommended the use of SBAR as an example to improve clinical handover. As such, there has been a proliferation of literature using SBAR as a handover technique to demonstrate improvement in clinical handover in bedside clinical handover (Chaboyer *et al.*, 2010), wound care management (Sibbald and Ayello, 2007), shift to shift handover (Brown, 2007) and emergency department handover (ED management, 2007). Other publications use the principles of SBAR and create different variants to suit local needs, such as ISBAR (Thompson *et al.*, 2011) and ISOBAR (Porteous *et al.*, 2009, Yee *et al.*, 2009).

While the use of a minimum data set is widespread, it is worth noting that while the use of a minimum data set has been demonstrated to improve communication, there remains a lack of evidence to show that the use of a minimum data set supports better and safer patient care.

2.5.4.2 Standardised operating protocols

There is increasing literature investigating the use of standardised operating protocols to improve clinical handover.

Turner *et al.* (2009) developed a five step approach for clinical handover improvement. The team collected an extensive amount of data from medical and nursing handover to arrive at a five step standardized operating protocol: preparation, design, implementation, evaluation and maintenance (Turner *et al.*, 2009). The emphasis, however is on flexibility depending on local socio-cultural context (Turner *et al.*, 2009). This work was subsequently further developed and incorporated into the national guideline for clinical handover improvement in Australia, known as the OSSIE guide (Australian Commission on Safety and Quality in Health Care, 2010).

Joy *et al.* (2010) conducted a pre-intervention and post-intervention analysis of clinical handover quality using direct observations in a specialised, multidisciplinary unit. The team demonstrated that a formal structured handover process with a standardised operating protocol improved clinical handovers as evidenced by the reduction in technical error per handover from 6.24 to 1.52 (Joy *et al.*, 2010).

Bedside handover has received significant attention due to the Garling report into hospital care in New South Wales. Garling's recommendation was that clinical handover should happen at the bedside (NSW Department of Health, 2009). McMurray *et al.* (2010) conducted extensive research into bedside handover and suggested a protocol for bedside handover. Chaboyer *et al.* (2009) developed a bedside clinical handover practice guideline and protocol for one hospital and found that it improved safety, efficiency and teamwork. This standardised protocol was later utilised in six wards at two different hospitals. It was found that bedside clinical handover might improve accuracy and service delivery as well as promote patient-centred care (Chaboyer *et al.*, 2009). The team then analysed 532 semi-structured observations and 34 in-depth interviews to identify key success factors for the standardised operating protocol. They found that it was important to include clinical handover as part of quality improvement but the motivations and concerns of clinicians regarding clinical handover improvement must also be taken into consideration.

It appears that the use of standardized operating protocols in clinical handover improvement has achieved some success. However, current literature supports the view that the standardized operating protocol must take into account local practices for it to be successful.

2.5.4.3 Education and training

While education and training had been emphasised as an important intervention in improving clinical handover (Horwitz *et al.*, 2007), there appeared to be no literature that reported on the impact of an educational program on clinical handover. However, in more recent times, Farnan *et al.* (2010) and Lyons *et al.* (2010) have attempted to address this issue emphasising the impact of education and training programs on clinical handover. Furthermore, the need for education and training is further enhanced by a recent study which argued the need to improve formal education and training of doctors in clinical handover (Cleland *et al.*, 2009).

Farnan *et al.* (2010) developed an observed simulated handover experience training model. The participants were students who were involved in the experience as an elective course. The program lasted for one week with interactive workshops and simulations. Evaluation of the educational program included self-perceived preparedness as well as an objective assessment by resident staff. The research showed that the teaching program with a standardised handover training exercise improved self-perceived preparedness for performing an effective handover significantly (Farnan *et al.*, 2010).

Lyons *et al.* (2010) implemented a training session for junior doctors and introduced a standardised handover protocol to improve morning clinical handover at a neuro-critical care unit. They found that although the clinical handover content improved after the training sessions, the quality returned to baseline with a new cohort of untrained doctors, although the standardised handover protocol has continually been used (Lyons *et al.*, 2010).

Cleland *et al.* (2009) conducted a qualitative focus-group study, exploring the views of doctors in regard to clinical handover education and training. They found that new doctors felt unprepared for handover and are seen as poor at handing over. The article argued that formal education and training for handover is required before they qualify as doctors working within the healthcare system.

These recent studies emphasise the role of education and training in improving handover. More importantly, all staff must be trained and continuous training is important to maintain the improvement of clinical handover activities.

2.5.4.4 Electronic clinical handover systems

Recent literature has provided new insights into the development and implementation of electronic clinical handover systems.

Raptis *et al.* (2009) compared the quality of information transfer between paper-based and electronic-based medical handover during after-hours shifts and found that electronic handover provides a better continuity of care through more complete fields of information. There was little resistance to change and this was attributed to the fact that these handover sessions involved young junior doctors who were IT savvy as well as the fact that there was continuous training available (Raptis *et al.*, 2009).

Ryan *et al.* (2011) utilised hospital emails for clinical handover. They created a minimum data set for information transfer and the outgoing team would email the patient handover information to the incoming team. They demonstrated a statistically significant reduction in medial hospital length of stay from five days to four days (Ryan *et al.*, 2011). The results were still significant after taking into consideration possible confounders. This is a very significant study as it has demonstrated that an improvement in handover leads to improvement in patient care.

Thomas *et al.* (2009) developed guidelines into the safe use of electronic tools for clinical handover. Showell *et al.* (2010) suggested that the implementation of electronic clinical handover systems must fit into local clinical practice through a recent study which investigated the socio-technical aspects of electronic clinical handover systems.

Recent literature has provided further evidence that electronic clinical handover systems might assist in clinical handover, information transfer during handover and improvement in patient care. The ease of use of the technology, consistent training as well as socio-technical integration into current practices are important in the successful implementation of electronic clinical handover systems.

2.6 Chapter reflections

This chapter has provided a review of selected literature deemed relevant in quality and safety in healthcare, the use of electronic tools in quality and safety in healthcare, clinical handover and the adoption of user-centred approaches in quality and safety in healthcare.

A review of the literature has found that the delivery of clinical care is a high risk area associated with a high rate of adverse events. Various efforts have been undertaken to reduce the rate of adverse events and a few models have been developed to improve the understanding of quality and safety in healthcare. There are two main areas which the literature has addressed in the domain of quality and safety. The first is fatigue and the other is the availability of ICTs to support the delivery of clinical care. The literature suggests that while the implementation of ICTs might improve the quality and safety in healthcare delivery, it could also sometimes lead to adverse events. Further analysis indicated that the issue arose as a result of problems with the socio-

technical integration of the ICT. A proposed way in which the usefulness of ICTs can be improved upon is through the involvement of users in the understanding, design, implementation and revision of the ICT.

Fatigue was found to be one of the main issues leading to adverse events. As such, recent guidelines have focused on reducing the number of working hours of clinicians. In doing so, the need to ensure continuity of care for the patient is paramount. A review of the literature in clinical handover at the start of this research revealed that clinical handover amongst clinicians was not an area that was well researched. There was no standardised understanding of clinical handover and strategies developed to improve clinical handover had not attracted much attention from the medical profession. While the use of electronic tools had been suggested and used in an attempt to improve clinical handover, there was no literature available on how these electronic tools had been designed or implemented. More importantly, there were no studies available which provided an in-depth understanding of the process of clinical handover.

This research is located at the intersection of the key domain areas of clinical handover, user-centred approaches and the use of electronic tools within the broader discourse of quality and safety in healthcare. This research aims to explore the use of a user-centred approach in understanding shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine. Chapter 3 provides a detailed discussion of the methodology adopted in addressing the research questions and associated research objectives stated in Section 1.4.

Chapter 3 Methodology

3.1 Introduction

This chapter provides a detailed discussion and description of the methodology adopted in addressing the research questions and objectives stated in Section 1.4. The researcher has obtained ethics approval (ref H8664) from the Human Research Ethics Committee (Tasmania) Network. This chapter is structured as follows:

- Section 3.2 discusses the research philosophy and states the ontology and epistemology adopted in this research. As this is an exploratory research, a subjective ontology with an interpretivist epistemology was deemed the most appropriate research philosophy.
- Section 3.3 discusses the research strategy employed, which consisted of a multi-snapshot qualitative case study using a user-centred approach to collect data from consultants and multiple cohorts of registrars and interns who rotated through the Department of General Internal Medicine.
- Section 3.4 details the research design and procedures. This research was conducted over three phases. Phase One involved the use of observations, semi-structured interviews and compilation of clinical handover notes over extended holiday periods to obtain an in-depth understanding of clinical handover and clinical handover improvement from the participants' perspectives. Phase Two involved the use of focus groups and design workshops to obtain a further understanding of clinical handover and clinical handover improvement, and to assist in the design of an electronic tool. Phase Three involved the use of further observations, semi-structured interviews and a compilation of clinical handover notes to further explore the influence of the electronic tool on the participants' understanding of clinical handover and clinical handover improvement and also to obtain an understanding of the outcomes of using a user-centred approach to clinical handover improvement.
- Section 3.5 describes in detail the data collection techniques utilised. These included observations, semi-structured interviews and compilation of clinical handover notes in Phases One and Three, and focus groups and design workshops in Phase Two.
- Section 3.6 describes the data analysis techniques utilised and provides an illustration of how the data were analysed drawing on the principles of grounded theory. The range of analysis techniques deployed included coding, constant comparison and memoing.
- Section 3.7 describes how the data analysed in each phase were integrated across the three phases and interpreted. The relationships that emerged between axial codes within each core category and across core categories were compared across the three phases and interpreted based on the researcher's knowledge obtained from being deeply embedded in the field.
- Section 3.8 describes how the key findings which emerged from the integrated data analysis and interpretation were further interpreted and discussed in relation to available literature.

- Section 3.9 provides a summary reflection of the chapter.

3.2 Research philosophy

This section describes the research philosophy underpinning this research. Philosophical assumptions refer to the researcher's view of the world and how they obtain knowledge (Trauth, 2001) and are discussed in terms of ontology and epistemology.

3.2.1 Ontology

Ontology is the study of existence and reality and refers to the perceived nature of the world around us. It addresses issues of whether the empirical world is objective or subjective (Orlikowski and Baroudi, 1991, Burrell and Morgan, 1985). A subjective ontological view can be described as one which emphasises the subjective reasoning through which humans construct their own reality (Orlikowski and Baroudi, 1991). It implies that the researcher assumes that the social world is produced and reinforced by humans through their actions and interactions. According to Chua (1986:604), "the issue of ontology lies prior to and governs subsequent epistemological and methodological assumptions".

This research is a qualitative case study which explores shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine using a user-centred approach. Exploratory research is useful to "become familiar with the basic facts, setting and concerns" (Neuman, 2000:22). A preliminary review of the literature available (Australian Council for Safety and Quality in Health Care, 2005) indicated that early research strategies consisted predominantly of quantitative surveys and to a lesser extent, qualitative interpretive case study techniques. While the use of surveys is suitable for creating categories or classifications, classifying a sequence of steps or stages and reporting on the background context of situations (Neuman, 2000), it does not provide a rich detailed insight into the researched phenomena. In order to obtain rich insight into the domain of clinical handover and clinical handover improvement, a subjective ontological approach was considered most appropriate.

3.2.2 Epistemology

Epistemology refers to the beliefs and assumptions in which knowledge is constructed and acquired (Cavaye, 1996). These beliefs relate to how one might begin to understand the world and communicate this knowledge to others (Burrell and Morgan, 1985). The interpretivist approach is based on an ontology in which reality is subjective, a social product constructed and interpreted by humans as social actors according to their beliefs and value systems (Darke *et al.*, 1998). Interpretivist researchers conduct studies to understand and describe the nature of the world. They believe that human interaction creates social circumstances. The research method used to collect data is largely qualitative in nature. They describe the full holistic picture of the situation (Boland, 1985). Interpretivism seeks relevance in the research by explicitly including an investigation of the context of the phenomenon under study (Keen, 1991). Utilising an interpretive approach for this research ensures that the researcher gains a deep understanding of the phenomenon under study while acknowledging the associated subjectivity. The focus of this research is on experiences related to clinical handover and clinical handover improvement which provide the researcher with a substantial understanding of how human beings operate in certain cultural and contextual situations (Orlikowski and Baroudi, 1991). It is intended, by using an

interpretivist epistemology, to “understand phenomena through the meanings that participants assign to them” (Orlikowski and Baroudi, 1991:5).

This research adopts an interpretivist epistemology. It is the researcher’s intent to examine the rich contextual data obtained as much as possible without forming any preconceived ideas. It would be inappropriate to strive for objectivity at the expense of forgoing the chance to highlight the context and conditions in which this research is conducted. The nature of interpretive research is such that the researcher enters a social setting without *a priori* constructs and allows the constructs to emerge while the researcher is in the field learning about and trying to understand the phenomenon.

3.3 Research strategy

The aim of this research is to explore shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital’s Department of General Internal Medicine. As such, the research strategy consisted of a multi-snapshot qualitative case study adopting user-centred approaches.

3.3.1 Qualitative research

Qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live. Kaplan and Maxwell (1994) argue that the goal of understanding a phenomenon from the point of view of the participants and its particular social and institutional context is largely lost when textual data are quantified. Qualitative research is increasingly being used in health research due to the complexity of the phenomena being studied, which include social and cultural norms and perceptions that impact on behaviour and medical practice (Wears and Berg, 2005). This is particularly important in the area of quality and safety improvement. Traditional healthcare management and quality and safety improvement models are based on business and biomedical models, and emphasise quantitative parameters and performance indicators (Pope *et al.*, 2002). The complexity inherent in the delivery of healthcare and the differing perceptions of quality and safety in healthcare amongst different players dictate the need to consider a different approach. A qualitative approach provides the elements required to fill this gap by taking into account the human factor, especially the perceptions, experiences and behaviours of patients and healthcare professionals (Tripp-Reimer and Doebbeling, 2004).

It is suggested that a qualitative research methodology serves three important roles in quality and safety research in healthcare (Pope *et al.*, 2002, Sofaer, 2002):

- Identifying salient features of care (from patients and healthcare professionals) to improve delivery of care;
- Identifying obstacles to change; and
- Complementing other research approaches by assisting the initial development of measures or by explaining findings.

While recent literature (Wears and Berg, 2005) suggest that these are important roles for the use of a qualitative research methodology in healthcare improvement, in essence, a qualitative research methodology is used in a very specific context to investigate a particular aspect of care delivery. One could argue that the pre-conception of either identifying obstacles to change or identifying explanations for the findings measured can diminish the role of qualitative research methodologies.

3.3.2 A case study approach

The case study approach is often cited as the most common and accepted qualitative research method used in information systems (IS) (Cavaye, 1996, Orlikowski and Baroudi, 1991). Case study research is particularly useful for capturing the intricacies, processes, roles and changes of organisations (Marshall and Rossman, 1995) and is considered an appropriate research method when the examination and understanding of context is important or when the research is of an exploratory nature. For example, case study research may lead to a more informed basis for theory development (Yin, 1994, Eisenhardt, 1989, Bonoma, 1985) in a newly developing area of research. The greatest strength of case study research compared to other methods is its ability to capture reality in greater detail and to allow analysis of more variables than is possible in other approaches (Galliers, 1992).

Case study research may involve a positivistic (Yin, 1994, Lee, 1989, Yin, 1989, Benbasat *et al.*, 1987) or interpretive epistemology, employing either quantitative or qualitative research methods, or a combination of the two. Although past IS researchers have used case study research in a positivistic manner, there has been a notable increase in interpretivist use of case study research (Walsham, 1995). Interpretivist case studies have been widely used in the social sciences (Silverman, 1998) and are gaining wider acceptance in the information systems arena. Although Yin (1989) supported the use of case research from a positivist view, his belief that case studies can be best used to explore “how” and “why” questions supports an interpretivist approach to using a case study strategy (Walsham, 1995). There are several facets associated with case study research. Cavaye (1996) suggests that case study research can take an inductive or deductive research approach. This research adopting user-centred approaches to explore clinical handover improvement starts with an inductive approach in Phase One followed by a deductive approach in Phases Two and Three. From an interpretivist perspective, Urquhart (1999) identifies that the case study approach brings four dimensions to interpretivist research, and enables the researcher to:

1. Produce rich insights from the data;
2. Draw specific implications;
3. Develop concepts within the data; and
4. Provide a base to generate theory.

Within the scope of healthcare, particularly in regard to quality and safety, a case study of a single organisation is often informative and recognised as a useful and acceptable method in order to improve healthcare delivery (Jeffs *et al.*, 2006, Reason, 2004). The case study method has been

used to analyse patient safety issues (Reason, 2004) and to identify strategies to improve quality and safety of patient care (Jefferies *et al.*, 2006).

The examination and understanding of the context in which IT is used in clinical handover is particularly important when the research is of an exploratory nature. This is indicative of areas where there is little understanding of how and why processes or phenomena occur or where the experience of individuals and the context of actions are critical (Darke *et al.*, 1998, Benbasat *et al.*, 1987). The theory surrounding the use of IT in clinical handover is not well developed, as the phenomenon is dynamic and still immature and unsettled. This is evident in the clinical handover literature where terminology and a common language and set of definitions are not yet clear or widely accepted (Wong *et al.*, 2008).

A multi-snapshot approach was chosen to overcome the limitations of a single snapshot case study (Walsham, 1995). In adopting a user-centred approach, it was important to capture experiences from different cohorts of users to be able to obtain a range of insights for clinical handover improvement that caters to the users. Multiple cohorts of interns rotate through the department each year and there are possible new staff changes at the beginning of each year, hence it was valuable to ascertain if there were major differences in the data obtained from the different cohorts. A single snapshot case study would only be able to provide insights from one cohort of participants and would not be able to capture the similarities and differences between the different cohorts and why that was the case.

3.4 Research design and procedures – Adopting a three phased approach

This multi-snapshot case study was conducted over three phases using a user-centred approach with a combination of data collection techniques. User-centred approaches have a long-standing tradition in IS and the effects and outcomes of adopting a user-centred approach are significant (see Section 2.4). A combination of data collection techniques was used in order to enhance the validity and reliability of this research (Golafshani, 2003, Patton, 2002).

Phase One involved the use of observations and semi-structured interviews to enable the researcher to obtain an in-depth understanding of clinical handover and clinical handover improvement in the department (see Section 3.5.1). Extended weekends including public holidays were chosen as points for data collection as this was an extended period of time when the home team⁹ might not be involved in the care of the patient. This was the time in which handover was arguably the most crucial in ensuring continuity of patient care and patient safety. Multiple points of data collection were planned at specific time periods to account for different cohorts of registrars and interns rotating through the department. Table 2 provides the details of the original plan for data collection.

⁹The medical team responsible and accountable for the care of the patient on a long term basis.

	Time period	Data collection methods	Participants
Phase One ¹⁰	23 - 27 Dec 2005 30 Dec 2005 - 3 Jan 2006 4 - 18 Jan 2006	Observations and compilation of clinical handover notes ¹¹ Semi-structured interviews	Consultants, registrars and interns
Phase Two	13 - 19 Apr 2006 20 Apr - 3 May 2006	Observations and compilation of clinical handover notes Semi-structured interviews	New cohort of registrars and new interns
Phase Three	22 - 27 Dec 2006 29 Dec 2006 - 2 Jan 2007 3 Jan 2007 – 17 Jan 2007	Observations and compilation of clinical handover notes Semi-structured interviews	New cohort of registrars and interns

Table 2: Original data collection plan

This plan was revised at the conclusion of Phase One when the department decided to trial the use of technology as part of their ongoing efforts in improving clinical handover. The researcher was invited to participate in this initiative, and took up the opportunity to assist the department in the design of an electronic tool for clinical handover. The plan for data collection was then revised to take into account the time required for the development of the electronic tool (see Table 3).

	Time period	Data collection methods	Participants
Phase One	23-27 Dec 2005 30 Dec – 3 Jan 2006 13 – 19 Apr 2006 4 – 18 Jan 2006	Observations and compilation of clinical handover notes Semi-structured interviews	Consultants, registrars and interns
Phase Two	Oct – Dec 2006	Focus groups Design workshops	New cohort of registrars and interns
Phase Three	5-10 Apr 2007 12 - 26 Apr 2007	Observations and compilation of clinical handover notes Semi-structured interviews	New cohort of registrars and interns

Table 3: New data collection plan

Phase Two involved the use of focus groups and design workshops (see Section 3.5.2). Conducting focus groups with a new cohort of registrars and interns served two purposes. Firstly, it enabled the researcher to familiarise herself with the new cohort of registrars and interns within a short

¹⁰ Two time periods were chosen for data collection because the extended holiday periods were close to each other, providing the researcher with more opportunity for data collection.

¹¹ All analyses of clinical handover notes were conducted by the clinical handover leader and discussed with the researcher.

time frame and secondly, it enabled the researcher to collect data within a short time frame to assist in moving forward with the design workshops to obtain functional requirements for the design and development of the electronic tool.

Phase Three involved the same data collection techniques as in Phase One (see Section 3.5.3). Observations and semi-structured interviews were used to enable the researcher to obtain an in-depth understanding of clinical handover and clinical handover improvement after the introduction of the electronic tool. More specifically, the researcher was interested in exploring the influence of the electronic tool on clinical handover and clinical handover improvement and also the influence of adopting a user-centred approach to clinical handover improvement.

3.5 Data collection techniques

This section describes the data collection techniques utilised within each phase of this research. Phases One and Three involved the use of observations, semi-structure interview and a compilation of clinical handover notes. Phase Two involved the use of focus groups and design workshops.

3.5.1 Phase One

Observations, semi-structured interviews and compilation of clinical handover notes were utilised as data collection techniques in Phase One with semi-structured interviews forming the core data set. Interviews should be the primary source of data (Walsham, 1995) but should be supplemented with other forms of field data in an interpretivist study (Walsham, 2006). All consultants, registrars and interns working at the Department of General Internal Medicine at the time Phase One was conducted were invited to participate in this research as they were all involved in clinical handover in some form. An information sheet and consent form was distributed by the clinical handover project registrar at one of the morning handover sessions and participants indicated their willingness to participate by signing the consent form and returning it to the clinical handover project registrar. Five out of seven consultants, five out of six registrars and all seven interns agreed to participate in this research. The researcher did not collect any data in the form of observations, interviews or clinical handover notes from the two consultants and one registrar who did not indicate that they were willing to participate.

3.5.1.1 Observations

Observations were used as the first data collection technique in Phase One to allow for the participants to become familiar with the researcher and vice versa, and also to allow the researcher to obtain a basic understanding of how clinical handover worked in practice in its natural setting. It is important to explore the differences between what people say they do, what they think they do and what they actually do (Nøhr and Botin, 2007). Systematically observing organisational settings, team behaviour and interactions is extremely useful in exploring quality and safety issues as it allows the researcher to uncover everyday behaviour first hand rather than only relying on interview accounts (Pope *et al.*, 2002). These methods are being increasingly used in the study of organisation and care delivery (Murphy, 2001) and can be very useful in uncovering what really happens in particular healthcare settings (Pope *et al.*, 2002).

Atkinson and Hammersley (1994) draw a distinction between participant and non-participant observation by developing a fourfold typology:

- The complete observer - the researcher remains in the background and watches and listens;
- The observer as participant - the researcher participates as if an organisational member;
- The participant as observer - the researcher participates fully but overtly as a researcher;
- The complete participant - the researcher acts as an organisational member.

The researcher took on the role of a complete observer in thirty-eight handover sessions which included morning handover (8 – 8:30am), evening handover (4:30 – 5pm) and night handover (9:30 – 10pm). These observation sessions were conducted over three extended holiday periods (23 – 27 December 2005, 30 December 2005 – 3 January 2006 and 13 – 19 April 2006).

The researcher arrived five minutes prior to the start of each scheduled handover session to familiarise herself with the environment and the participants involved in the handover. To ensure that her presence did not interfere with the routine activities that took place handover, the researcher positioned herself (marked X) close enough such that she could effectively observe and document the handover activities but also ensured that there was sufficient physical space between her and the participants to minimise the impact of her presence (see Figure 6).

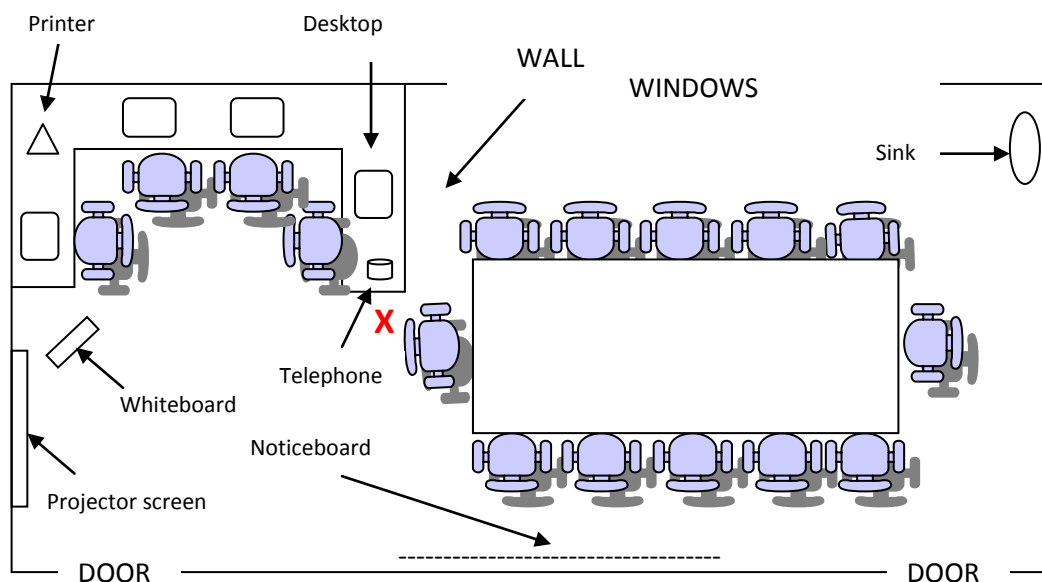


Figure 6: Layout of clinical handover room

The researcher took extensive notes during the observation sessions. These observation notes included:

- Location of handover (including proximity to support facilities eg. whiteboard, computer, printer)
- Environment
- Start time / end time
- Participants involved
- Punctuality
- Role of the participants

- Factors which may impact on handover
- Ongoing discussions at handover

At the end of each “formal” handover session, the researcher stayed behind to observe what the participants did with all the handover documentation and also observe discussions which occurred after the more senior staff (either consultants and/or registrars) had left. The researcher only left the field after all the participants had gone.

Once the researcher finished each observation session, she immediately documented all other thoughts for that particular handover session. All of these observation notes were then collated and entered into the computer.

3.5.1.2 Semi-structured interviews

Seventeen semi-structured interviews with an average duration of thirty minutes were conducted to gather information about the participants’ understanding and experiences of clinical handover and their perceptions of how clinical handover could be improved. Semi-structured interviews provide flexibility in the use of open ended questions to explore experiences and attitudes (Pope *et al.*, 2002). The interview questions were formulated to encourage participants to discuss issues relating to the research without imposing any limitations or constraints as to how the questions may be answered (Doolin, 1996). The question frame that was used in Phase One was:

1. *How would you define clinical handover?*
2. *What is your role in the clinical handover process?*
3. *What type of information do you require from handover?*
4. *How much clinical detail do you require of handover cases?*
5. *What has been your experience of the process of clinical handover?*
6. *What factors would you identify as influencing clinical handover?*
7. *What is your vision of what an ideal handover should be?*
8. *How would you improve the current clinical handover process?*

All staff who participated in clinical handover sessions were invited to participate in the semi-structured interviews. Five out of seven consultants, five out of six registrars and all seven interns agreed to be interviewed. A fixed time and location was arranged at least three days prior to the scheduled interview. It was preferable for the interviews to be conducted outside the participant’s work hours, away from the work area, in a room to ensure minimal distractions and privacy. However, this did not always happen according to plan. Clinical commitments meant that at times participants had to perform emergency procedures or had a heavier than expected workload and cancelled at short notice. These interviews were then rescheduled at a time that was convenient to the participant. The researcher also ensured that she was readily available so as not to miss any opportunity to conduct the interviews. At times, the researcher would be contacted at short notice to conduct an interview.

All interviews were conducted face-to-face, at a time and venue convenient for the clinicians. In most cases, interviews were either conducted in the residents’ quarters for registrars and interns

and in the consultant's offices for consultants. These two venues were primarily selected as it was situated away from the clinical work area and provided privacy for both the participant and the researcher. The participant also had access to the phone and was able to respond their clinical commitments if required.

The researcher started the interview by briefing the participants about the aims and objectives of the interview. Permission was then sought from the participants to audio record the interview as the application of grounded theory in data analysis requires detailed data collection to reveal relations and conclusions through the abundance of data (Hansen and Kautz, 2005). All participants agreed to have the interview recorded. The researcher utilised various techniques in order to extract information from the participants, including pauses and probes. Probes were used only at certain points when clarifications or justifications were required. The researcher only moved on to the next question when she was certain that the participants had completed their answers. The researcher took notes during each interview which included not only their responses during the interviews but also their non-verbal expressions and reactions during the interview. At the conclusion of each interview, the researcher reflected on the interview conducted and took additional notes, if any. These interview notes were then collated into a format ready for data analysis. The researcher attempted to the best of her ability to transcribe all interviews within forty-eight hours of data collection in preparation for data analysis.

3.5.1.3 Compilation of clinical handover notes

Compilation of clinical handover notes was done by the clinical handover project registrar to protect the confidentiality of the patients. The clinical handover project registrar de-identified the clinical handover notes and presented the researcher with a summary classification of what the notes meant e.g. background of the patient, treatment initiated, tests requested, actions taken. The researcher used these clinical handover notes to familiarise herself with the information that was exchanged at clinical handover which provided input into the question frame used in the semi-structured interviews.

3.5.1.4 Integrating observations, semi-structured interviews and clinical handover notes

As stated in Section 3.5.1, while the observation sessions and compilation of clinical handover notes were conducted first, semi-structured interviews formed the core data set in Phase One. Conducting observation sessions in the first instance allowed the researcher to become acculturated in the field and also develop an understanding of the processes and content of clinical handover within its natural setting. The clinical handover notes also provided the researcher with an idea of the types of information that was transferred at clinical handover and the similarities and differences in the information that was transferred. Having obtained a basic understanding of clinical handover from the observation sessions and de-identified clinical handover notes, the researcher was then better able to formulate the question frame used in the semi-structured interviews. At the analytical stage, the observation notes and the clinical handover notes served to inform the analysis of the interview transcripts (see Section 3.6.1.4).

3.5.2 Phase Two

It emerged at the end of Phase One that junior clinicians were keen to trial an electronic tool as part of efforts to improve clinical handover. This was communicated to the clinical handover

project registrar who then discussed it with the Head of Department. A decision was made by the Department of General Internal Medicine to trial the use of an electronic tool as part of their ongoing clinical handover improvement efforts and the researcher was invited to be involved in that process to assist in the design and development of the electronic tool. Due to the limited time frame available, focus groups (as opposed to semi-structured interviews) were used as one of the data collection techniques to gather information about the participants' understanding and experiences of clinical handover and their perceptions of how clinical handover could be improved. The data collected served as a starting point for discussions in the design workshops which was the next data collection technique utilised to obtain the functional requirements for the electronic tool. All new registrars and interns working at the Department of General Internal Medicine at the time Phase Two was conducted were invited to participate in the focus groups. Consultants were also invited to participate in the focus groups, but they were not the focus of data collection in Phase Two as they had already previously been interviewed in Phase One. Consultants were also not identified as being the primary users. Five out of six registrars and six out of seven interns agreed to participate in the focus groups. The two that did not participate were rostered on night shift and were not available when the focus groups took place. In addition to the registrars and interns working at the Department of General Internal Medicine, final year medical students were also invited to participate in the design workshops, as they were to be the future users of the electronic tool.

3.5.2.1 Focus groups

Focus groups are relatively efficient in comparison to individual interviews in terms of gathering equivalent amounts of data, and can be used in partnership with other qualitative methods (Morgan, 1997). Another advantage of the use of focus groups is their ability to observe interaction on a topic as opposed to reaching such conclusions through *post hoc* analyses of interview transcripts (Morgan, 1997). This process of sharing and comparing provides an opportunity for the researcher to collect evidence on how the participants themselves understand their similarities and differences. This search for connections amongst different experiences is also what researchers do in trying to understand their data (Agar, 1986). Morgan (1997) emphasises experiences as opposed to attitudes and opinions, as a discussion of experiences produces a livelier group dynamic and people are more comfortable comparing different experiences than challenging someone else's opinion. According to Bryman (1988), the ability to make larger connections between the results from different methods is often highly desirable.

Due to the time constraints on this research to accommodate the design and development of the electronic tool, focus groups were chosen as a data collection method in this phase to affirm the results obtained from the previous phase before proceeding with the design and development of the electronic tool with this cohort of participants. Conducting focus groups with a new cohort of registrars and interns served two purposes. Firstly, it enabled the researcher to familiarise herself with the new cohort of registrars and interns within a short time frame in an informal environment and secondly, it enabled the researcher to collect data within a short time frame to assist in moving forward with the design workshops for the electronic tool. Two focus groups were conducted, with one group consisting of six interns, and the other consisting of five

registrars, to learn about the participants' understanding and experiences on clinical handover and their perceptions of how clinical handover can be improved.

The question frame used for the focus groups was adapted from that used in the semi-structured interviews in Phase One. The participants had a maximum of one hour available to attend the focus groups, and so the researcher had to limit the number of questions put up for discussion. The question frame that was used in Phase Two was:

1. *What is your understanding of clinical handover?*
2. *What type of information do you require of handover cases?*
3. *What has been your experience of clinical handover?*
4. *How do you think clinical handover can be improved?*

Focus group discussions were conducted during the participants' lunch break to facilitate attendance. A light lunch was provided. Focus group discussions were conducted in a seminar room within close proximity to the clinical work area in the event that participants had to attend to their clinical commitments. Telephones were also available for participants to use in the event they were paged. While it is highly recommended that focus groups be audio recorded, the researcher chose not to do so as participants in Phase One had already expressed discomfort at being recorded in a group setting. Audio recording the focus groups risked the participants holding back on their responses and compromising the richness of the data obtained. The researcher instead took extensive notes and all material gathered from the focus groups were documented as soon as possible upon completion. The data from the focus groups was compared with the data collected in Phase One and assisted in moving forward with the design workshops to obtain the functional requirements for the electronic tool.

3.5.2.2 Design workshops

Four design workshops were held over a six week period. All interns, registrars and consultants working in the department at that time were invited to participate in the design workshops. Final year medical students were also invited as they were going to be the potential users of the electronic tool the following year as interns. The clinical handover project registrar took on the role of a facilitator to help guide the case discussions.

Case scenarios are widely used as part of user-centred design techniques (Immo *et al.*, 2010, Sutcliffe *et al.*, 2010, Bødker, 2000). At the first workshop, three cases (see Figure 7) were presented to the participants and the participants were asked to discuss what had gone wrong and how it could have been improved.

Case 1

Mr X had some laboratory tests done at 4:45pm. There was no handover to the evening team to check the test results. As a result, the patient suffered a cardiac arrest.

Case 2

Mr Y is an elderly man just admitted on Friday with a new problem. Treatment was started and handed over to the Saturday team. The registrar working on Saturday saw the patient but did not handover to the next registrar. The handover message was "Check Hb level". Hb level was checked but did not correlate with the clinical scenario whereby the patient was fasting and actively bleeding but received no fluid replacement. Mr Y was found to be hypotensive the next day and required resuscitation. Mr Y was also found to have other abnormal blood test results.

Case 3

It's a public holiday and everyone is busy. There are 5 pages of handover notes passed on to the incoming team. The incoming team was supposed to check levels for Mr Z at 8am and 12 noon and administer medication according to the level. Unfortunately, this was missed and an adverse event occurred.

Figure 7: Case scenarios

Based on these discussions, the participants were asked what functions they wanted incorporated into the electronic tool. A whiteboard and some whiteboard markers were made available for the participants to graphically illustrate what they wanted the tool to look like and also how they wanted to navigate around the tool. It quickly became apparent to the researcher that different participants wanted different things out of the electronic tool. The researcher had to actively maintain the engagement of all participants while ensuring that the interns who at the end of Phase One were identified as the primary end users of the electronic tool be the primary drivers in the design and development of the electronic tool. By the end of the first workshop, the participants had reached a conclusion that the electronic tool should only be used as a support tool rather than a replacement of the entire clinical handover process. The researcher then drafted an initial prototype using Microsoft Word and disseminated this to participants in their choice of either an electronic form or a hard copy for consideration for the next workshop.

At the second workshop, the participants provided their comments on the initial prototype, any additional functional requirements that they wanted out of the electronic tool and also any changes that they wanted made on the initial prototype. The three cases that were put up for discussion in the first workshop served as a reference point for any additional functional requirements or changes that they wanted made. Participants were asked to refer to the cases and provide justifications as to why what they wanted was important and relevant. This was then put forward to the other participants for consensus. At the conclusion of the second workshop, the researcher made revisions to the initial prototype and disseminated the revised version to the participants for consideration.

The third workshop allowed for the fine tuning of all functional requirements which had been identified as essential to clinical handover. Participants were asked to rank the functional

requirements as there was a limited budget available for the design and development of the electronic tool. These requirements were then communicated with the software developers.

A fourth workshop was conducted during a departmental meeting as consultants indicated their desire to provide some input into the electronic tool that had been developed. In that workshop, the researcher presented the functionalities of the electronic tool to the consultants and sought feedback. Some of the feedback obtained was in relation to what type of blood test results they thought should be included and where adequate white space should be provided for handwritten information.

A trial version of the electronic tool was developed with mock data for users to provide further comments. These comments were then incorporated into a live version of the electronic tool which was put forward for trial. Participants were given access to the trial version and were asked to test the system using real-life data. Participant comments were collected in various forms including email and formal and informal discussions. The final version of the electronic tool was implemented in December 2006.

3.5.2.3 Integrating focus groups and design workshops

Data collected from the focus groups served as a starting point for discussions in the design workshops. For example, participants had indicated in the focus groups a range of information that they required at clinical handover sessions and this provided the basis for discussion in order to reach a consensus as to which information was mandatory and how that information should be displayed in the electronic tool.

3.5.3 Phase Three

As in Phase One, observations, semi-structured interviews and compilation of clinical handover notes were utilised as data collection techniques in Phase Three. All new registrars and interns working at the Department of General Internal Medicine at the time Phase Three was conducted were invited to participate in the research. As with Phase One, an information sheet and consent form was distributed by the clinical handover project registrar at one of the morning handover sessions and participants indicated their willingness to participate by signing the consent form and returning it to the clinical handover project registrar. While there was an open invitation for consultants to participate in the data collection in Phase Three if they wished to, they were not the primary focus of data collection. The focus of data collection in this phase was to collect data about the influence of the electronic tool on clinical handover and clinical handover improvement. It had already been established at the end of Phase One that consultants did not participate much in clinical handover except when they were post-take. All seven registrars and all seven interns agreed to participate in this research. This phase consisted of ten further observation sessions and fourteen semi-structured interviews after the introduction of the electronic tool to further explore the participants' understanding, expectations and experiences of clinical handover after involving them in the clinical handover improvement initiative.

3.5.3.1 Observations

The researcher conducted ten observation sessions between 5 – 10 April 2007¹² which included morning handover (8:00-8:30am), evening handover (4:30-5:00pm) and night handover (9:30-10:00pm). By this stage of the research, the researcher had taken on the role of an observer as participant (Atkinson and Hammersley, 1994) as she was perceived by participants as someone with knowledge about the electronic tool implemented for clinical handover improvement.

As in Phase One, the researcher arrived five minutes prior to the scheduled clinical handover session to observe the utilisation of electronic clinical handover support tool by the participants. The researcher documented all comments made by them during that time. During the clinical handover session, the researcher positioned herself at the end of the table, away from the clinical handover team when observing the clinical handover sessions (see Figure 6). While this was done to ensure that there was minimal interaction between the participants and the researcher during the clinical handover session, the researcher found that there were instances when she was approached for help when participants encountered difficulties with using the electronic clinical handover support tool. Observation notes were recorded during this period. At the conclusion of each handover session, the researcher stayed behind to be available to any participant who wanted to raise any issues or concerns relating to the use of the electronic clinical handover support tool.

3.5.3.2 Semi-structured interviews

Fourteen semi-structured interviews were conducted to gather information about each participant's understanding, expectations and experiences of clinical handover after the introduction of the electronic clinical handover support tool. The researcher also collected data on the participant's perceptions and feedback on the electronic clinical handover support tool. All interns and registrars who were present during the observation period were invited to participate in the interviews. The question frame used in Phase Three included all the questions used in Phase One and three additional questions about the electronic tool:

1. *How would you define clinical handover?*
2. *What is your role in the clinical handover process?*
3. *What type of information do you require from handover?*
4. *How much clinical detail do you require of handover cases?*
5. *What has been your experience of the process of clinical handover?*
6. *What factors would you identify as influencing clinical handover?*
7. *What is your vision of what an ideal handover should be?*
8. *How would you improve the current clinical handover process?*
9. *What do you think about the electronic handover support tool?*
10. *How useful do you think this system is on impacting on patient safety?*

¹² 5-10 April 2007 was an extended holiday period. Only one period was chosen in Phase Three because the next extended holiday period was Christmas 2007, which fell outside the timeline for data collection.

11. *What improvements do you think can be made to the existing clinical handover support tool?*

12. *Do you have any other comments that you wish to add?*

As in Phase One, all interviews were arranged at least three days before the scheduled interview date. Participants were contacted again about one hour prior to the scheduled interview time to ensure availability. In the event that clinicians were busy with clinical work, the interviews were rescheduled to a different date and/or time. The researcher made herself readily available so as not to miss any opportunity to conduct the interviews. At times, the researcher would be contacted at short notice to conduct an interview.

All interviews were conducted face-to-face, at a time and venue convenient for the participants. The researcher utilised the same techniques as those in the Phase One interviews, and also used a similar question frame. This was to ensure that the researcher did not have a preconceived notion that clinical handover would have been improved with the introduction of the electronic tool. More importantly, using similar questions would facilitate some form of comparison of the data across the three phases.

As in Phase One, the researcher started the interview by briefing the participants about the aim and objectives of the interview. Permission was then sought from the participants for audio recording. All participants agreed to be recorded. The researcher utilised various techniques in order to extract information from the participants, including pauses and probes. Probes were used only at certain points when clarifications or justifications were required. The researcher only moved on to the next question when she was certain that the participants had completed their answers. A total of fourteen semi-structured interviews were conducted lasting between 15 – 40 mins. The researcher took notes during each interview which included not only the participants' responses during the interviews but also their non-verbal expressions and reactions. At the conclusion of each interview, the researcher reflected on the interview conducted and took additional notes. These were then collated into a format ready for data analysis. The researcher attempted to the best of her ability to transcribe all interviews within forty-eight hours in preparation for data analysis.

3.5.3.3 Compilation of clinical handover notes

As stated in Phase One (see Section 3.5.1.3), compilation of clinical handover notes was conducted by the clinical handover project leader to protect the confidentiality of the patients. The clinical handover project leader de-identified the clinical handover notes and presented the researcher with a summary classification of what the notes meant e.g. background of the patient, treatment initiated, tests requested, actions taken. These de-identified clinical handover notes were then used as a basis for comparison with the observation and interview data.

3.5.3.4 Integrating observations, semi-structured interviews and compilation of clinical handover notes

As in Phase One (see Section 3.5.1.4), semi-structured interviews formed the core data set in Phase Three. Conducting observation sessions and collecting de-identified clinical handover notes first enabled the researcher to familiarise herself with and establish a rapport with the new cohort of participants and to obtain background into the information that is transferred after the

electronic tool in order to assess the influence of the electronic tool on handover. While the question frame was very much similar to that used in Phase One, the researcher included additional questions in relation to the use of the electronic tool, based on the observation sessions conducted and the de-identified clinical handover notes. At the point of analysis, the observation data and de-identified clinical handover notes served to inform the analysis of the semi-structured interviews.

3.5.4 Data reconciliation

In most instances, the combination of data collection methods utilised did not result in any discrepancies. However, in some instances where discrepancies were found, the data collected from observation sessions were deemed to be the more accurate representation of the data. For example, it was indicated in some semi-structured interviews that clinical handover was an orderly process but when the researcher was in the field, she found that clinical handover apart from morning handover often disorganised and at times could be very chaotic.

3.6 Data Analysis

Data collected through qualitative methods is often unstructured and can be hard to manage. A large proportion of it is usually text based consisting of transcripts of interviews of discussions, field notes and other written documents. The researcher has to make sense of this cumbersome data set while retaining a hold of the original accounts and observations from which it is derived. Data analysis is the process of bringing order, structure and meaning to the masses of collected data (Marshall and Rossman, 1995). A challenge faced by all qualitative researchers is to “make sense of massive amounts of data, reduce the volume of information, identify significant patterns and construct a framework for communicating the essence of what the data reveal” (Patton, 1990:371-372). There are multiple facets and approaches to data analysis encompassing diverse techniques and there is no one ‘right’ approach (Coffey and Atkinson, 1996, Tesch, 1990). The choice of analytic approach is influenced by a number of factors, including the particular research goals and questions being asked and the methods used for data collection, as well as the types of data available for collection and investigation (Morse, 2003, Coffey and Atkinson, 1996). It is worth noting that while description is the basis for analysis, a different view of the data can also be obtained through analysis. As such, analysis is an iterative process and each iteration of analysis might provide new and different perspective on the data (Dey, 1993).

The data collected from Phases One to Three have been analysed drawing on the principles of grounded theory. IS researchers have suggested that the procedures outlined in grounded theory should be used more as rules of thumb, and be modified in accordance with research requirements rather than used rigidly (Cummings and Borycki, 2011). Grounded theory is increasingly being used more flexibly and treated as a set of guidelines rather than a structured methodology in the field of information systems research (Urquhart and Fernandez, 2006, Urquhart *et al.*, 2000). Qualitative researchers in health informatics have used grounded theory in a variety of ways. Grounded theory has been used by researchers to highlight factors which affect the success and failure of health information systems (Ash *et al.*, 2005, Ash *et al.*, 2001), to identify key themes associated with the diffusion of innovations (Ash *et al.*, 2001), to develop or use theoretical frameworks to describe how health information systems are adopted (Kaplan and Shaw, 2004) and the factors that influence their adoption from a human, social and organisational

perspective (Peute *et al.*, 2010, Ash *et al.*, 2005, Kaplan and Shaw, 2004, Ash *et al.*, 2001). Grounded theory has also been used to develop models and frameworks that can be used in the real world to guide practitioners (Peute *et al.*, 2010, Ash *et al.*, 2005, Ash *et al.*, 2001) and develop ontologies that form the basis of the design of health information systems (Kuziemsky and Lau, 2010). Cummings and Turner (2009) have also used grounded theory to learn about user experiences in a new health information systems and determine the potential outcomes of the implementation of such systems.

The researcher was sensitive to the new and recurrent themes which emerged in the analysis of the observation data and semi-structured interviews and deployed the principles of theoretical saturation (Eisnerhardt, 1989) to guide the depth and duration of data collection and analysis with both individuals and in focus groups.

3.6.1 Phase One

This section provides a detailed discussion of how the data that was collected through observations, semi-structured interviews and clinical handover notes in Phase One were analysed drawing on the principles of grounded theory and integrated.

3.6.1.1 Observations

Data collected in the form of observations involved a preliminary process of making notes, which has been recognised as an analysis process in its own right (Spradley, 1980). Conducting observations in a workplace, the technology, actors and their interactions require analysis on the part of the researcher prior to documenting those observations as field notes (Jorgensen, 1989). Figure 8 provides an illustration of the field notes the researcher took at observation sessions.

Observation notes 24 December 2005 9:30pm

- Handover started late at 10.00pm in the Residents' quarters → Late start
- REG K, REG J and INT M started the handover first → Not all participants present, does this have impact on completeness of information transferred?
- Halfway through, someone asked another person who was in the Residents' quarters a question at the top of their voice → Distractions
- INT M was asking the REG K what needed to be done → Task focused
- INT L arrived at 10.05pm → Punctuality, has information been missed?
- King Arthur was showing on television → Distractions
- REG K had a chat with another registrar who happened to be present about one of his patients → Distraction, not relevant to handover
- The resident had left at 9:30pm → Had he handed anything over or was there nothing to handover?
- Halfway, someone asked another person who had come in a question at the top of their voice → Distractions (persons not relevant to handover sessions)
- REG K had a short discussion with INT E about the patients but shortly after it separated into a handover between registrars and handover between interns → Different handovers, impact?
- REG K later asked INT E if there was anything he should know about → Situation awareness
- REG K told INT E to see a patient who overdosed but apparently one of the residents had already got that call and someone said that she might have gone to see the patient.
- Intern handover still going on – INT L was flipping through her notes to pass on to INT E and she didn't appear to be very organized and clear about which patient needed handing over → How did this impact on handover?
- INT E and INT L were both watching television in between their handover conversations → How did this impact on handover?
- Handover ended at 10:45pm → Very long handover

Figure 8: Illustration of observation notes

3.6.1.2 Semi-structured interviews

Data collected in the form of semi-structured interviews were analysed drawing on the principles of grounded theory. According to (Strauss and Corbin, 1994) pg 273, grounded theory is “a general methodology that is used for developing theory that is grounded in data systematically gathered and analysed”. Analysis drawing on the principles of grounded theory is a systematic process to theory generation. The theories and concepts are grounded in the data and the process of analysis requires the researcher to go through multiple cycles of reading and re-reading the data in order to detect themes embedded within the data (Neuman, 2000). The principles of three stage coding, constant comparison and analytical memos were applied as a method for systematically organising, reducing and conceptualising the qualitative data.

3.6.1.2.1 Coding

Coding refers to an analytical process in which data is reduced and categorised into a format to facilitate analysis. A code is a symbol applied and attached to a segment of words, phrases or sentences in order to assign meaning. Codes are therefore categories derived from research questions, hypotheses and key concepts (Miles and Huberman, 1994). Codes provide a link between the empirical raw material and the researcher’s theoretical concepts (Seidel and Kelle, 1995). Although coding is not restricted to grounded theory, the process as it is described under the grounded theory method provides a systematic way of generating codes and makes the conceptualisation process explicit (Dey, 1993). The researcher adopted Strauss and Corbin’s three stage coding process (Strauss and Corbin, 1990) which is described as follows:

Open Coding

Open coding is the first pass through the data whereby written data from field notes or interview transcripts are conceptualised depending on the unit of analysis. The level of analysis required to generate codes can vary by word, phrase, sentence, paragraph or the entire document (Creswell & Plano Clark, 2007). The unit of analysis adopted in this research was at a phrase level and every phrase was open coded. A spreadsheet was used to document the codes assigned. The line number was entered into the left column and the corresponding code was entered into the right column. This allowed the researcher to make reference to the code at a later date for further analysis of the data.

The researcher immersed herself in the data and examined the transcripts and observation notes as well as diagrammatic sketches of handover sessions paying particular attention to themes which were relevant in addressing the research questions and research objectives. Audio recordings of the interviews were also used together with the interview transcripts so that the researcher was better able to reflect upon the participant and the interactions that took place during the interview. An illustration of some of the open codes generated from a semi-structured interview is provided in Table 4.

	<i>consultant characteristics</i>	<i>behavior</i>	<i>specific</i>	<i>preferences</i>
150	the personality of the consultant or the way they Yeah, there is a particular consultant who likes to			
	<i>obtain information</i>	<i>succinct</i>	<i>abrupt</i>	
151	hear the new patients in a very quick manner and then go, leave straight away. They sort of get onto			
	<i>duties</i>	<i>efficient</i>	<i>generalization</i>	<i>hesitation</i>
152	the ward round as quick as possible, so. And then there is others, who, who, umm..yeah.. like, every			
	<i>preferences</i>	<i>discussion</i>	<i>time pressure</i>	
153	new patient presented to them, they will manage to find something to talk about, or just, just quickly			
	<i>guidance</i>	<i>junior staff</i>	<i>relevance</i>	
154	comment on something that the rest of us will go, like something medical that could be useful. And,			
	<i>meticulous</i>			
155	you know, compare to the whole handover is finished before they leave, you sort of know what			
	<i>consultant characteristics</i>	<i>preferences</i>		
156	consultants are and what kind of handover they like.			

Table 4: Illustration of open codes from semi-structured interviews in Phase One

The large number of codes generated through the process of open coding was condensed in two ways. Firstly, the open codes were sorted in alphabetical order to highlight multiple occurrences of the same code. Secondly, the nature of the coding process meant that there might be instances when two different codes are assigned to the same phenomena. To overcome this problem, the researcher condensed the codes by grouping similar codes together. The researcher generated a list of codes assigned, to help in the coding process. The consistency of coding improved over time with each code becoming better defined.

Axial Coding

The second stage of coding involved combining all the interviews and observation data together and then comparing the open codes and identifying relationships between the codes. This level of coding is a second pass through the data and explores the topics for patterns, similarities and exceptions. It also aims to identify the relevance and appropriateness of the open codes. Cases that supported emergent patterns were recorded as well as the contextual elements of the occurrences. Notable exceptions were also highlighted for further analysis. This level of coding aims to establish a connection within categories and link them with sub categories which are then used to generate conceptual themes. This second set of codes is more succinct and defined. Table 5 provides an exemplar of how the axial code *INDIVIDUAL PERSONALITIES* emerged.

Examples of open codes	Initial axial code	Axial code
leadership, guidance, mentoring, providing direction, instruction, lead, “model behavior”, junior focused, taking initiative	Leadership	Individual personalities
consultant characteristics, sense of humour, punctual, problem solving, wary, disorganised, organized, fearful, stubborn, unwilling to change, tedious, abrupt, lazy, unwilling to learn, don’t care, can’t be bothered, arrogant, selfish	Characteristics	
Effective, meticulous, conscientious, flexible, punctual, can do attitude	Qualities	

Table 5: Exemplar for axial code *INDIVIDUAL PERSONALITIES*

Selective Coding

This final stage of coding involved selecting the core categories and systematically relating them to other categories with the aim to collate previous codes in order to identify core categories and major themes. It involved refining, comparing, contrasting and developing the core categories and identifying and validating relationships amongst the core categories. It was at this stage that the researcher synthesised the findings and categories in order to allow for the theory to emerge from the data. The process of selective coding also examines the context and environment of how the participants answered the interview questions. This aims to identify the implicit meanings of core themes and categories which might not have been apparent in the earlier coding process. Through this process of selective coding, the concept and theory was developed. Figure 9 shows a list of selected axial codes and core categories.

Axial codes	Core categories
Policies and guidelines Clinician roles Education and training Department tradition	Departmental requirements
Understanding Expectations Individual personalities Communication styles Cultural background Behaviour	Participant attributes
Workload Venue Distractions Number of participants Team dynamics	Environmental considerations
Attendance Support Education component Structure Information transfer Clinical handover outcomes	Clinical handover experience
Documentation Access Information Prioritisation Tools	User requirements

Figure 9: Axial codes and core categories

3.6.1.2.2 Constant comparison

The second key technique used in data analysis was constant comparison. Constant comparison was first proposed by Glaser and Strauss (1967) in grounded theory analysis and has since been

used in various ways in data analysis. Miles and Huberman (1994) have provided a practical aspect of constant comparison in association with grounded theory. Constant comparison is a useful technique in analysing data in order to generate a common theory.

The defining rule for the constant comparative method was proposed by Glaser and Strauss (1967): “while coding an incident for a category, compare it with the previous incidents in the same and different groups coded in the same category”. This method is used in order to compare data continuously with other data to detect emerging categories, themes and concepts. The constant comparison method can identify commonalities amongst concepts and categories, leading to a higher level of abstraction to allow theory to emerge (Allan, 2003). There are four important stages to the constant comparative method:

1. Generation of categories
2. Integration of categories and their context and properties
3. Delimiting the theory
4. Writing the emerging theory.

In this particular research, the constant comparison method was used throughout the data analysis phase. Constant comparison was carried out during the coding process, within each interview as well as across different interviews. Similar categories were grouped together in order to detect trends, while differences were noted. Memos were written describing the process of comparison as well as noting the rationale for the grouping to provide a point of reference. This process assisted the generation and description of theory. It is important to highlight that the process of constant comparison allows the development of not only descriptive categories but also explanatory categories which help with theory emergence (Lincoln and Guba, 1985: 341).

3.6.1.2.3 Memoing

Memoing is the act of reflection by researcher during data collection and data analysis. Memos are notes that researchers make to remind themselves about concepts and/or highlight relationships (Groenewald, 2008). In qualitative research, memoing contributes significantly to its credibility. In grounded theory, memoing contributes significantly to the generation of theory.

Theoretical memoing and operational memoing were used in this thesis. Theoretical memoing refers to the attempt to derive meaning from the data. Theoretical memos are defined by Glaser (1978) as “the theorising write-up of ideas about codes and their relationships as they strike the analyst while coding.” In other words, the researcher documents the ideas which arise during data analysis. These memos form the record in conceptualising ideas and are used as the building block for emergence of theory (Elliott and Lazenbatt, 2005). Operational memoing on the other hand focuses on instructions and reminders that the researcher wrote to herself.

The researcher used memos as an instrument to capture ideas and insights as she went through the data. These thoughts were recorded and dated for future reference and analysis. Memoing forms an important part of data analysis as it forces the researcher to consider the codes, their properties and relationship as well as providing conceptual evidence for these.

3.6.1.2.4 Integrating coding, constant comparison and memoing

Core categories were generated through the combined use of coding, constant comparison and memoing. These techniques were used to consider relationships between codes and are considered critical for theory development (Urquhart, 1997, Strauss and Corbin, 1990).

3.6.1.3 *Clinical handover notes*

Data collected in the form of clinical handover notes were analysed drawing on the principles of grounded theory in conjunction with the clinical handover project registrar as the researcher did not have any medical background. This formed a source of data that could support or refute results obtained from the observation sessions and semi-structured interviews.

3.6.1.4 *Integrating data analysis of observations, semi-structured interviews and clinical handover notes*

Data analysed preliminarily from observations, semi-structured interviews and compilation of clinical handover notes were integrated to form the final analysis presented in Chapters 4 – 7. As stated in Section 3.5.1, semi-structured interviews formed the core data set for this thesis. The data analysed from the semi-structured interviews were then compared with the field notes from observation sessions or clinical handover notes or both to form the final analysis. There were some instances whereby there were conflicting results. These were then highlighted and interpreted, and are discussed in Chapter 8. For example, analysis of the semi-structured interviews from a consultant's perspective revealed that clinical handover was an orderly process of information transfer which occurred at a predetermined time at an allocated space. However, analysis of the notes from observations sessions revealed that clinical handover did not always happen on time and in its allocated space, and neither were all participants present at the same time for handover. Analysis of the clinical handover notes were not relevant in the example provided.

3.6.2 Phase Two

This section provides a discussion about how data collected through focus groups and design workshops were analysed.

3.6.2.1 *Focus groups*

Data collected from the focus groups were analysed drawing on the principles of grounded theory as with the semi-structured interviews in Phase One. While it would have been ideal to record the focus groups and analyse the transcripts, the focus groups were not recorded as participants had expressed reservations previously about being recorded in a group setting. The researcher had to take extensive notes during the focus groups and these notes were then analysed drawing on the principles of grounded theory as illustrated in the semi-structured interviews (see Section 3.6.1.2). This was then compared with the data obtained in Phase One to ascertain if there were significant differences in the different cohorts of registrars and interns in their understanding and experiences of clinical handover and clinical handover improvement.

Open, axial and selective coding (see Section 3.6.1.2.1) was adopted in the analysis of focus group data. Unlike the semi-structured interviews that were recorded, the researcher did not record the focus groups as participants had previously expressed reservations about being recorded in a group setting. The researcher had to examine the extensive focus group notes that she took

instead and pay particular attention to themes which were relevant in addressing the research questions and research objectives.

3.6.2.2 Design workshops

Data collected from design workshops were in the form of extensive notes (see Figure 10) and were analysed in conjunction with the clinical handover project registrar and the participants during the workshops in order to obtain the functional requirements and user-interface for the electronic tool. This was done through numerous iterative feedback cycles (see Section 3.5.2.2).

- Want section on background, issues, action, investigation, management
- But, we should not need to actually type it every time.
- Need to be able to delete them
- Need to be able to change them, on what is required and what not.
- Need to have pathology results displayed or a link to the pathology system
- Want to have radiology or radiology report
- How about consults to other team?
- Need a list of patients with handover notes
- Need to be able to print them
- They want to have evening handover
- But want a leader to help provide opinion
- Evening intern should be at the place at 16:30 and everyone can then come in and out
- But want a way to convey that information as well, just in case can't get in time
- On hospital intranet so that everyone can type in at anytime
- Must be able to let us type at anytime we want
- Can we capture everyone who came in over the last 24 hours
- How about patients in DEM
- Can we use it in all units rather than just general medicine?
- Results → FBE, UEC, LFT, CMP, D-dimer, troponin, coag, CRP
- Possibility of including echo, endoscopy etc?

Figure 10: Illustration of notes taken at design workshops

These functional requirements (see Chapter 6) provided the basis for the development of the electronic tool and were communicated to the software developers.

3.6.3 Phase Three

Data collected in Phase Three is similar to that in Phase One and utilised the same data analysis techniques (see Section 3.6.1). Data collected in Phase Three was in the form of observations, semi-structured interviews and compilation of clinical handover notes and were analysed drawing on the principles of grounded theory.

3.7 Integrated data analysis and interpretation across three phases

Data that had been analysed in each of the three phases were brought together to present an integrated data analysis across the three phases (see Chapter 8). The relationships between axial codes within a core category and across core categories and the changes in these relationships were analysed across the three phases.

The researcher then provided an interpretation of the integrated data analysis based on the relationships that emerged between the axial codes in each core category and between core categories and the changes in these relationships. The researcher's interpretation of the data was based on the insights which she had obtained from being deeply immersed in the field.

Key findings emerged through this process of analysis and interpretation across the three phases which are discussed in Chapter 9.

3.8 Discussion of key findings

The key findings which emerged from the integrated data analysis and interpretation across the three phases are interpreted and discussed in relation to the available literature. The discussion of the key findings is based primarily on the key domain areas of clinical handover, user-centred approaches and electronic tools within a broader discourse of quality and safety in healthcare. These literature have been reviewed in Chapter 2.

Some key findings which emerged required the researcher to look at literature beyond the three key domain areas identified in order to be able to provide a broader discussion of the healthcare environment in general. These literature were referred to in Chapter 9 to facilitate an understanding of some of the key findings identified.

After the key findings were discussed in relation to the literature, they were then used as the basis to answer the research questions and associated research objectives stated in Section 1.4.

3.9 Chapter reflections

This chapter has provided a discussion of the research philosophy, and has stated the ontology and epistemology adopted in this thesis. A subjective ontology utilising an interpretive epistemology was deemed the most appropriate in this exploratory research. The research strategy consisted of a multi-snap shot case study conducted over three phases to capture the understanding of clinical handover and insights for clinical handover improvement from multiple cohorts of participants. The use of a multi-snapshot case study approach had not previously been used in clinical handover research however, given the complexities of clinical handover, the researcher decided that a multi-snapshot case study was important in order to capture the intricacies of clinical handover from the participants' perspectives.

This chapter has discussed the research design and data collection methods used to collect the data over three phases. Different qualitative data collection methods were utilised to cater to the anticipated changes that were going to be made to clinical handover by the Department of General Internal Medicine through the three phases. As an opportunity arose for the researcher to be involved in the development of an electronic tool for clinical handover upon the completion of Phase One, the user-centred approach used in this research builds across the three phases to understand clinical handover and clinical handover improvement (including the introduction of an electronic tool). A combination of observations, semi-structured interviews and compilation of clinical handover notes were used in Phases One and Three to understand clinical handover and clinical handover improvement. A combination of focus groups and design workshops were used in Phase Two to not only understand clinical handover and clinical handover improvement but also assist in the development of an electronic tool. Data were analysed in each phase drawing on the principles of grounded theory and the range of data analysis techniques utilised included coding, constant comparison and memoing. Data analysis was then integrated across the three phases and interpreted (see Chapter 8) to obtain key findings which were then discussed in

relation to available literature (see Chapter 9). The next chapter will present an analysis of the data from Phase One.

Chapter 4 Data analysis Phase One

4.1 Introduction

This chapter is the first of three analysis chapters (see Figure 11) and provides an analysis of the data from seventeen semi-structured interviews informed by thirty-eight observation sessions and a compilation of clinical handover¹³ notes conducted in Phase One. The next chapter (Chapter 5) will provide an analysis of the data in Phase Two and Chapter 7 will provide an analysis of the data in Phase Three.

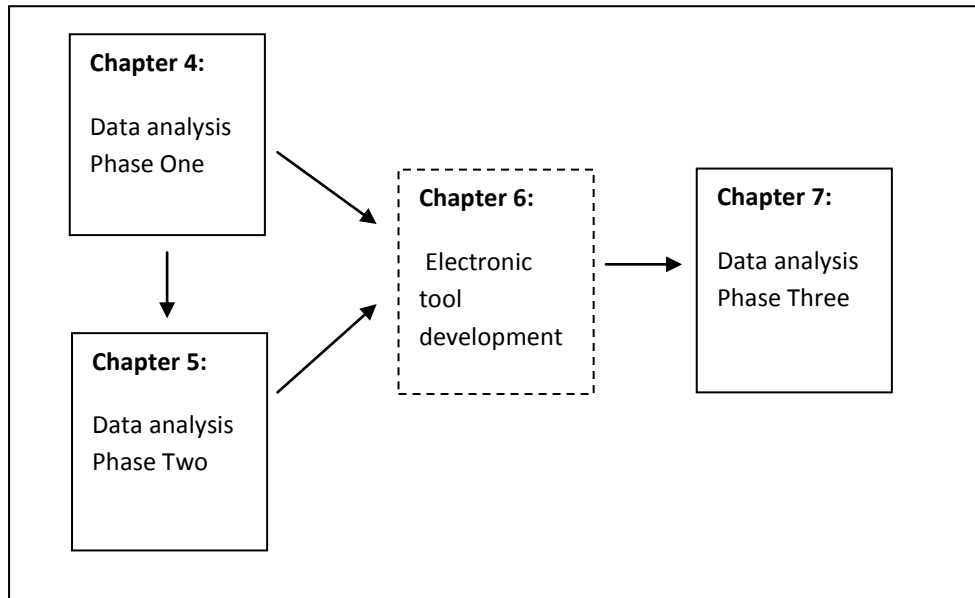


Figure 11: Data analysis across three phases

- Section 4.2 provides an overview of the coding process as used in this research. A three-stage coding process was applied to systematically reduce and organize the data into axial codes and core categories.
- Section 4.3 provides a detailed description of the axial codes associated with each core category and the relationships between the axial codes within each core category. The core categories of DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and USER REQUIREMENTS are discussed with references made to relationships within the axial codes in each of the core categories.
- Section 4.4 provides a description of how the five core categories – DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and USER REQUIREMENTS relate to one another.
- Section 4.5 provides a summary reflection of the chapter.

¹³Clinical handover notes in this stage were used to provide the researcher with background as to what types of information were presented and discussed during clinical handover sessions.

4.2 Overview of the coding process

Seventeen interview transcripts informed by thirty-eight observation sessions were coded to systematically reduce the data into a more manageable form. Open coding was conducted on each of the seventeen transcripts in accordance with the process described in Section 3.6.1.2.1. All the interviews were open coded first and once the open coding was completed, the next stage involved systematically organising the codes and applying the technique of constant comparison to arrive at the axial codes for each of the interviews as described in Section 3.6.1.2.2. Twenty-six axial codes were identified at the completion of this process. Selective coding was subsequently employed reflecting on the research questions and research objectives to identify core categories. According to Strauss and Corbin (1990:119), selective coding is “the process of selecting the central or core category, systematically relating it to other categories, validating those relationships and filling in categories that need further refinement and development”. Five core categories appeared to have relevance to the exploration of the state of clinical handover in the Department of General Internal Medicine and will be discussed below.

4.3 Core categories

This section provides a detailed description of the core categories and their associated axial codes which emerged from the coding process described in Section 3.6. It also highlights the relationships between the axial codes within each core category. The core categories identified are as follows:

- DEPARTMENTAL REQUIREMENTS
- PARTICIPANT ATTRIBUTES
- ENVIRONMENTAL CONSIDERATIONS
- CLINICAL HANDOVER EXPERIENCES
- USER REQUIREMENTS

The following provides a detailed description of the core categories in Phase One.

4.3.1 Departmental requirements

DEPARTMENTAL REQUIREMENTS was the first core category identified in Phase One and refers to directions instituted by the Department of General Internal Medicine for clinical handover.

There are four axial codes associated with this core category.

- *POLICIES AND GUIDELINES* refers to a formal direction provided by the Department of General Internal Medicine on the conduct of handover.
- *CLINICIAN ROLES* refers to the functions that each intern, registrar or consultant serves in patient care as well as during clinical handover.
- *EDUCATION AND TRAINING* refers to the teaching of clinical handover to participants.
- *DEPARTMENT TRADITION* refers to the way things have always been done.

Figure 12 provides an illustration of the relationship between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

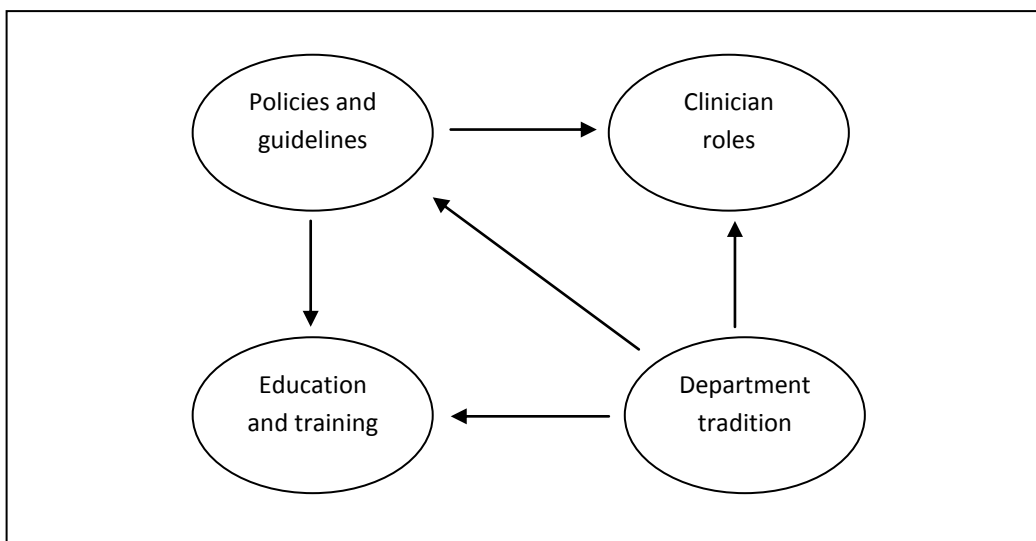


Figure 12: Relationship between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

POLICIES AND GUIDELINES weakly influenced *CLINICIAN ROLES* and *EDUCATION AND TRAINING*.

DEPARTMENT TRADITION strongly influenced *POLICIES AND GUIDELINES*, *CLINICIAN ROLES* and *EDUCATION AND TRAINING*.

4.3.1.1 Policies and guidelines

The Department of General Internal Medicine had developed clinical handover guidelines at the start of 2005 (see Appendix 1) as part of previous efforts to improve clinical handover. A clinical handover manual (see Appendix 2) had also been prepared by the clinical handover project registrar in the Department of General Internal Medicine towards the end of 2005.

Informal discussions with the Head of Department and the clinical handover project registrar revealed that the clinical handover guidelines and the clinical handover manual had been distributed to all new and existing staff working in the Department of General Internal Medicine. Observation sessions however, revealed that there appeared to be problems with the way the documents had been disseminated. Although the guidelines were printed and available on the notice board in the designated clinical handover room, the document was not printed on the organisation's letterhead, neither was there a release date and a review of the guidelines. Some participants even mentioned in the interviews that they had not been given a copy of the documents.

REG K: *But you know the thing with these policies, sometimes instead of being disseminated through the normal medium, once it's on the board, and if it's not really, you know people are just trying to focus on what's needed and what's not and say if it doesn't really involve you and me then not really interested in it*

It was also apparent in the interviews that the clinical handover guidelines and clinical handover manual did not necessarily have any impact on the way clinical handover was conducted. The guidelines and manual only worked if there was a champion or leader available at that clinical

handover session to ensure that the participants actually adhered to what was stated. This was illustrated by REG A below.

REG A: *Oh you know well we're following the format that XX had handed out to us and so long as he is there he does make sure, he prompts us for it so I guess we are following it*

This view was also shared by a consultant working in the Department who questioned the usefulness of guidelines in improving handover but at the same time indicating that guidelines in relation to content might assist in improving clinical handover.

CON N1: *guidelines might not help at all. So other than guidelines about what the content of handover should be, I don't think having a strict policy or protocol would improve the process.*

POLICIES AND GUIDELINES had a weak influence on *EDUCATION AND TRAINING*. The clinical handover guidelines and the clinical handover manual were designed to also serve as an educational tool for the interns and registrars who conducted clinical handover on a daily basis. The clinical handover manual for example included a section on how to handover information to the next clinician (see Figure 13). However, many participants were unaware of the clinical handover guidelines and clinical handover manual that was available and this resulted in *POLICIES AND GUIDELINES* having a very minimal influence on *EDUCATION AND TRAINING*.

Information that needs to be handed over.

- **Issues**
 - Issues are background information about the patient. Issue list should be concise and provide a holistic view of the patient
 - It should contain information necessary for the action required and recommendations provided.
 - Common abbreviations can be used
- **Action**
 - This is a one line sentence to indicate the action that you want the receiving team to do.
 - This section should be direct and specific
 - Investigations ordered and requiring review should appear on this section.
- **Comment/recommendations**
 - This is to provide some recommendations to best manage the patient.
 - This is especially important if action is to check blood test results, then the receiving team should have some guidance as to what to do with the results.
 - Recommendations and comments should be short, specific and provide essential information.
 - It is acceptable to indicate that details for management are documented in patient's progress notes.

Figure 13: An excerpt from the clinical handover manual

POLICIES AND GUIDELINES also had a weak influence on *CLINICIAN ROLES*. While the clinical handover guidelines had given a clear indication of who was to take on the leadership role at clinical handover sessions (see

Figure 14), observation sessions revealed that often no one took on the leadership role for the evening and night handover sessions. The consultant who was present at morning handover sessions usually took on the leadership role for those sessions.

<p>Leadership</p> <p>The role will be taken by one of the following, who will also fill in the clinical handover sheet.</p> <ul style="list-style-type: none"> • Clinical Handover project registrar • Post-take consultant • Post-take registrar or night registrar
--

Figure 14: An excerpt from clinical handover guidelines

POLICIES AND GUIDELINES was influenced by *DEPARTMENT TRADITION* (see Section 4.3.1.4).

4.3.1.2 Clinician roles

Clinicians had different roles in patient care depending on their level of seniority. The different roles they played in patient care led to differences in their information requirements at clinical handover as illustrated by CON N1.

CON N1: *So between junior doctors it may be as simple as handing over of tasks whereas between residents, registrars it may be the handing over for the need of reassessments of patients or formulating investigative strategies or documents or diagnostic strategies. And between consultants it tends to be very brief and essentially is usually more of a courtesy than anything else.*

This view was shared by other participants. For example, INTs M and R believed that interns in practical terms did not participate in the long term management of patients. They were just there to cover the day-to-day issues.

INT M: *I think as an intern, it probably matters a lot less, because, hmm... in a practical sense, maybe in a more theoretical sense, yeah, you should be involved, but in a practical sense, the intern is probably not, it is not the person who is designing the management or the long term plan for that patient while they are admitted in the hospital. The intern's job is to make more of a day to day running.*

INT R: *because, in the, with the medical team that I was on, usually, my role as an intern, was really to, not to give any kind of presentation to the consultant or anything like that, it is usually the registrar is doing that and I will be in the background, doing blood forms and writing notes, and the sort of more routine stuff.*

As such, the handovers between interns were very different. Interns usually handed over separately on their own and their handover mainly involved the handing over of tasks and jobs which needed to be completed by interns in the next shift, rather than handing over the management and care of the patient.

INT V: *Umm... I just take down what I need as I go along, I mean from an intern point of view, most of the intern handover which are often jobs, mostly, rather than the patients.*

Registrars on the other hand tended to obtain information related to the overall management of the patient as their role was commonly related to decision making in the care of the patient. REG C provided some insights into the role of a registrar.

REG C: *my role as a reg was to make sure that I keep appropriate notes so that I can give a clear and succinct handover at the end of shifts and make notes in the oncoming shift. Um, I think it was my role to ask appropriate questions that to clarify information.*

While CON N1 indicated that consultant's handed over to each other out of courtesy, there were no corresponding responses from other participants indicating this, neither did the researcher observe consultants handing over to each other during the observation periods.

CON N1: *and between consultants it tends to be very brief and essentially is usually more of a courtesy than anything else.*

CLINICIAN ROLES was influenced by POLICIES AND GUIDELINES (see Section 4.3.1.1) and DEPARTMENT TRADITION (see Section 4.3.1.4).

4.3.1.3 Education and Training

While clinical handover had been identified as being very important in the continuity of patient care, there was no formal teaching in place both at the university level and at the hospital level on how to handover properly. This was reflected in all the interviews conducted. An example of this is illustrated by INT C who indicated that participants received minimal formal teaching in handover and they learnt through observing how other senior clinicians handover patients.

INT C: *Just by watching everyone else, certainly in medical school, there is nothing at all on handover, and the hospital that I work, well, we studied at before there wasn't handover.*

Within the Department of General Internal Medicine where efforts had already been made to improve clinical handover, there was still no formal teaching in clinical handover for staff rotating to the department apart from the availability of documentation containing clinical handover guidelines and a clinical handover manual which contains a section on how to do handover. Observation sessions revealed that providing education and training of clinical handover this way did not work as participants did not adhere to them. Many participants were even unaware of the existence of the clinical handover guidelines and clinical handover manual as an education tool. INT S for example identified that there was literature published in this area but did not know about the availability of the clinical handover guidelines and clinical handover manual disseminated by the Department.

INT S: *I mean, I have read some actual document, or like an article or which come in the AMA, or something...but nothing specific from the hospital or from the intern tutorial or from the university, no*

Other participants who were aware of the clinical handover guidelines and clinical handover manual chose not to follow them. Most of the participants acquired their skills relating to clinical handover on the job. This was more the case if their seniors in particular were interested in clinical handover and provided good on the job teaching in handover. This is illustrated by INT E below.

INT E: *I guess there is A4 bit of paper that saying this is some sort of a structure for handover, and so I you sort of notice that for that And then the other thing, I was working with XXX for my whole medical term, and so handover is a bit of his cup of tea, so it sort of... he sort of told me stuff as a result of that*

Interns were expected to know how to handover and more often than not, they had to learn on the job. Unfortunately, this process did not appear to work very well as participants believed that they did not receive feedback about how well they handed over information. This is illustrated by INT V below.

INT V: I don't mean to say that it wouldn't work better another way, but still, we have, we are either used to it or we have adjusted to it somewhat. And I think people are still that conscientious enough to make sure that the correct information does get to the right person. But you don't learn, that's the thing, you don't quite know what happen to that information.

EDUCATION AND TRAINING was influenced by POLICIES AND GUIDELINES and DEPARTMENT TRADITION (see Section 4.3.1.1 and 4.3.1.4).

4.3.1.4 Department tradition

Traditionally, there were four allocated times for clinical handover in the Department of General Internal Medicine (see Section 1.5.3). Morning handover occurred between 8:00 – 8:30am, afternoon handover (between interns only) occurred between 1:30-2:00pm, evening handover occurred between 4:30 – 5:00pm and night handover between 9:30 and 10:00pm.

Observation sessions revealed that in practice morning handover session was the most formal handover session and involved the largest number of participants. The consultant who was on-take that day and all the registrars, residents and interns in the Department would normally be present. The expectation of the presence of a consultant was dictated by the Department's tradition but it is also interesting to note that it was also tradition for CON J to not attend clinical handover sessions.

Afternoon handover occurred when an intern had a scheduled afternoon off and handed over any outstanding tasks to the covering intern. This was highly informal and did not necessarily happen.

Evening handover occurred when four teams reached the end of their shift and handed over to the on-take team who worked till 10:00pm. It is important to note that this did not necessarily happen and has been the Department's tradition for a while.

Night handover occurred when both the intern and registrar reached the end of their shift and handed over to the night intern and night registrar. Quite often, night handover occurred without a clear structure, despite the guidelines advocating a clear structure.

INT V: Whereas night handover happens in front of "Sex and the city", where everyone is watching TV, umm... and it also does like, it happens, like I have time that I come up and I actually miss the reg, because they left or somethingwhich is most of the time fine, but occasionally I wanted to add on something to a patient that we have been seeing that night. But by the time, the reg is gone and it is too late,

DEPARTMENT TRADITION strongly influenced POLICIES AND GUIDELINES. The clinical handover guidelines and clinical handover manual were written in part based on how things were done in the Department of General Internal Medicine. Traditionally speaking, consultants only attended morning handover when they did attend handover sessions. While the clinical handover guidelines and clinical handover manual emphasised the importance of the attendance of senior

clinicians, especially the consultants, they did not state that it was compulsory for consultants to attend all handover sessions.

DEPARTMENT TRADITION strongly influenced *CLINICIAN ROLES*. It was found that the Department of General Internal Medicine was highly hierarchical and this affected the roles of each participant at handover. Observation sessions revealed that often, morning handover did not commence till the consultant arrived despite that fact that some consultants were habitually late. Also, traditionally, the clinical handover sessions often ignored the interns' role in handover and even though it was found that the clinical handover guidelines and clinical handover manual did allocate time for the interns to handover during the formal handover sessions, observations revealed that often, the intern handover did not occur during the formal handover time and the interns usually had to quickly handover patients in a rush in the corridor outside the handover room.

DEPARTMENT TRADITION had a strong influence on *EDUCATION AND TRAINING*. The Department of General Internal Medicine had never conducted formal training of handover to the junior clinicians. Education and training was provided in an informal way through junior clinicians observing how the more senior clinicians conduct handover and learning through that process. Con H explained this process as "cultural osmosis".

4.3.1.5 Preliminary findings in core category DEPARTMENTAL REQUIREMENTS

Table 6 provides a summary of the unilateral relationships between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

The axial code	Influenced the axial code	Phase One
Policies and guidelines	Clinician roles	Weak
	Education and training	Weak
	Department tradition	-
Clinician roles	Education and training	-
	Department tradition	-
	Policies and guidelines	-
Education and training	Department tradition	-
	Policies and guidelines	-
	Clinicians roles	-
Department tradition	Policies and guidelines	Strong
	Clinician roles	Strong
	Education and training	Strong

Table 6: Summary of relationship between axial codes in core category DEPARTMENTAL REQUIREMENTS

The following presents the preliminary findings in the core category DEPARTMENTAL REQUIREMENTS:

1. The clinical handover guidelines which were developed at the start of 2005 and the clinical handover manual which was developed towards the end of 2005 have had minimal impact on clinical handover on the whole and clinical handover improvement (see Section 4.3.1.1).
2. Clinicians had different roles in patient care and in clinical handover depending on their level of seniority (see Section 4.3.1.2).
3. Clinicians indicated that there was no education and training on clinical handover (see Section 4.3.1.3) although there appears to be informal education and training provided through learning on the job (see Section 4.3.1.4)

4. Department tradition heavily dictated the way clinical handover was conducted in the Department (Section 4.3.1.4) as the policies and guidelines and the clinical handover manual were developed in part based on how clinical handover had been conducted in the Department.

4.3.2 Participant attributes

PARTICIPANT ATTRIBUTES was the second core category identified in Phase One and refers to the characteristics of the participants working in the Department of General Internal Medicine who are involved in handover. In this context, participants include interns, registrars and consultants.

There are six axial codes associated with this core category. These axial codes are defined as follows:

- *UNDERSTANDING* refers to the participant's knowledge of clinical handover. This includes what clinical handover is and what it should constitute.
- *EXPECTATIONS* refers to the participant's perceptions of what a clinical handover session should encompass.
- *INDIVIDUAL PERSONALITIES* refers to the participant's character and qualities.
- *COMMUNICATION STYLES* refers to how a participant relays or receives clinical handover information.
- *CULTURAL BACKGROUND* refers to the participant's diverse social, cultural and linguistic backgrounds.
- *BEHAVIOUR* refers to the participant's actions during clinical handover sessions.

Figure 15 provides an illustration of the relationships between axial codes in the core category PARTICIPANT ATTRIBUTES.

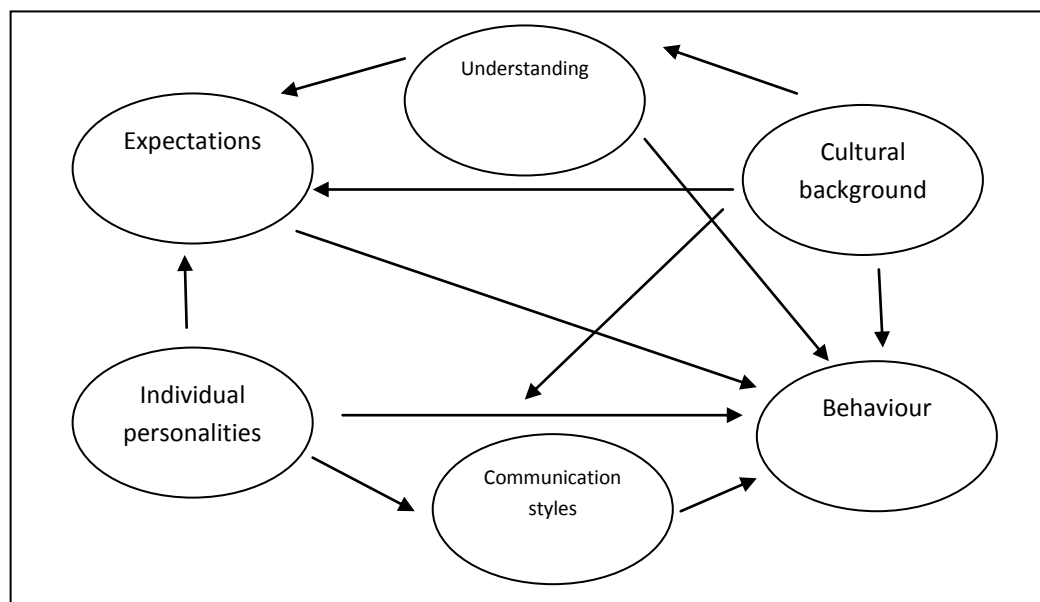


Figure 15: Relationships between axial codes in core category PARTICIPANT ATTRIBUTES

UNDERSTANDING strongly influenced BEHAVIOUR and EXPECTATIONS.

EXPECTATIONS strongly influenced BEHAVIOUR.

INDIVIDUAL PERSONALITIES strongly influenced COMMUNICATION STYLES, BEHAVIOUR and moderately influenced EXPECTATIONS.

COMMUNICATION STYLES strongly influenced BEHAVIOUR.

CULTURAL BACKGROUND strongly influenced BEHAVIOUR, UNDERSTANDING, EXPECTATIONS AND COMMUNICATION STYLES.

4.3.2.1 Understanding

The participants' understanding of clinical handover varied. Some participants had a very detailed understanding and took a holistic view of the entire clinical handover process. CON N, for example, identified that the transfer of patient information, provision of feedback and learning how to handover are three important elements in the clinical handover process.

CON N: clinical handover is when people taking over clinical care for the next shift to make sure that ah of a number of things. Firstly, that the actual issues of each patient are highlighted so we know what we are taking over, ah and what investigations have been done, and where they are in the pipeline so all that clinical detail is handed over. Um I think there should also be as a part of it um an educational component so that people that have been particularly out of hours, clerking and doing hard work are given the opportunity to ah both ask questions but also ask some feedback on the quality of the data they're presenting. Um the third part is that there are lots of other people present the interns and so on and they can learn both from the consultant's report but probably even more importantly the registrars and the more senior juniors doing the handover how to do it.

This understanding was not expressed by other participants, especially the more junior clinicians. At a registrar level, clinical handover seemed to be more about the outgoing registrar alerting the incoming registrar about problems and issues that need addressing to ensure the continuity of care for the patient.

REG C: I think clinical handover is where discussions between the ah, oncoming and outgoing teams of doctors to ensure that there's good continuity of care. Um... for all patients to highlight problems and issues that need addressing.

Interns also had a different understanding of clinical handover. Some interns did not see clinical handover as an important part of clinical practice. They saw their role in patient care as more task based. Therefore, they did not think it was as important for them to participate actively in clinical handover as expressed by INT M.

INT M: The intern's job is to make more of a day to day running, you know drug charts, fluids, blood tests, those things, to run smoothly, and be done appropriately, so, from, I think from that point of view, handover is probably a little less, a little less important to interns, as supposed to more senior staff.

An interns' understanding of clinical handover was that of obtaining and transferring tasks from one intern to the other rather than obtaining a thorough understanding of the patient and being involved in the management of the patient.

INT V: *Umm... I just take down what I need as I go along, I mean from an intern point of view, most of the intern handover which are often jobs, mostly, rather than the patients*

UNDERSTANDING strongly influenced *BEHAVIOUR*. CON J had the understanding that he was a consultant and so had no role in clinical handover and that clinical handover was the responsibility of the registrar.

CON J: *Well, it is the registrar that requires the information. Umm... Not me. See, I don't believe that the consultant has a particular place to play in that. I think that it can prolong things unnecessarily. Umm.. And my view is that the registrar, it is part of the registrar's training to get that right.*

From the observation sessions conducted as well as interviews from other participants, it was evident that CON J did not attend clinical handover. His understanding that a consultant did not have a role in clinical handover resulted in his behaviour in not attending clinical handover.

Other consultants on the other hand did not share the same view. CON H had a very different understanding of clinical handover which is reflected below. He had highlighted two aspects of clinical handover which he deemed was important. The first aspect is patient oriented and the second aspect is educational based. From the observation sessions conducted, CON H made it a point to obtain all the necessary information required in the care of his patients and also provided some form of education and training for the junior clinicians during handover sessions.

CON H: *Oh right um it's ah an attempt to get the clinicians who have been on for a shift to meet with the people taking over clinical care for the next shift to to make sure that ah of a number of things. Firstly, that the actual issues of each patient are highlighted so we know what we are taking over, ah and what investigations have been done, and where they are in the pipeline so all that clinical detail is handed over. Um I think there should also be as a part of it um an educational component so that people that have been particularly out of hours, clerking and doing hard work are given the opportunity to ah both ask questions but also ask some feedback on the quality of the data they're presenting. Um the third part is that there are lots of other people present the interns and so on and they can learn both from the consultant's report but probably even more importantly the registrars and the more senior juniors doing the handover how to do it and what the culture is like, that we have an open culture, that it is very important that you are able to express yourself succinctly, briefly but get a lot of information over in that period of time and they can see how people use that information and how it's done cause there is not a lot of that really as a student, particularly in the way that medical students now tend to be very much wanting educational things rather than on the ward in teams.*

This relationship between *UNDERSTANDING* and *BEHAVIOUR* is seen across different levels of seniority from interns to consultants. Registrars understood handover as being important to the continuity of patient care. As such, REG C indicated that she ensured that she took adequate notes in order to obtain a clear picture of patient care through the clinical handover process. REG C also considered educating the interns as part of clinical handover.

REG C: *my role as a reg was to make sure that I keep appropriate notes so that I can give a clear and succinct handover at the end of shifts and make notes in the oncoming shift. Um, I think it was my role to ask appropriate questions that to clarify information but also to try and educate the juniors about how to deliver handover effectively - mostly by leading by example – by giving a clear succinct history, um but also by asking questions of other juniors to try and clarify things so they understand what's important in the handover process.*

It was observed that REG C always made it a point to take down notes and clarify any doubts that she might have when she was handed over patients. REG C also provided some education and training to her interns by asking them questions about patients that were handed over.

INT M's understanding of clinical handover was that it was a task based activity and clinical handover amongst interns was of less importance than clinical handover amongst more senior staff. Therefore, INT M did not involve himself much in handover and he justified his actions based on his role as an intern.

INT M: for example, the interns are not, from my experience, it is that of a registrar to registrar handover and the intern wasn't involved at all. So, hmm... ... Yeah ... Hmm... ... That's fine... because like I say, it wouldn't really make much of a difference, because you are going to see the patient, and you have the registrar, and the plan will be formed, and your job is largely to carry out the tasks of that management plan anyway.

However, during an observation session, the researcher noted that INT M tried hard to participate in clinical handover by attempting to provide a good handover to the incoming team in order to ensure good patient care.

UNDERSTANDING also had a strong influence on EXPECTATIONS. An intern's understanding of clinical handover was that it was non-essential as their role was only to perform tasks and they were not involved in the overall management of the patient. Therefore, what they expected out of clinical handover was only to be made aware of the tasks that they were required to complete. This is illustrated below by INT V.

INT V: but the intern, for me, the interns are always more important to handover to the afternoon and evening ones where you are given particular jobs for other people to do.

CON J's understanding of clinical handover was that it was purely for information transfer and consultants should not be involved. Therefore, his expectation was that his registrar obtain adequate information during clinical handover and attended ward rounds punctually. He does not see himself as a participant in clinical handover and this was influenced largely by his understanding that clinical handover should be about information transfer and nothing else.

CON J: this is not a teaching session, it is in fact an information transfer session. If you have consultants in there and the whole thing is down a different track. It takes longer, and I don't want to do that, I don't want to start my ward round late.

UNDERSTANDING was strongly influenced by CULTURAL BACKGROUND (see Section 4.3.2.5).

4.3.2.2 Expectations

Different participants had different expectations of clinical handover. Some consultants were keen to be involved in clinical handover and their expectations of handover was that it was an organised activity. This was reflected in CON N's interview excerpt.

CON N: (clinical handover involves) a group of people involved in patient care to provide concise, clear and relevant information pertaining to patients under their care or that have been reviewed by them.

EXPECTATIONS strongly influenced *BEHAVIOUR* during clinical handover. Observations conducted confirmed that CON N's made an effort to ensure adequate transfer of patient care during clinical handover sessions. CON J however never attended handover and his registrars attended handover only to obtain the information and leave so that they were punctual for the start of their ward rounds (see Section 4.3.2.1).

The relationship between *EXPECTATIONS* and *BEHAVIOUR* was strong and evident across different levels of clinical seniority. As mentioned before, REG C had expressed her understanding that education was a part of clinical handover and junior clinicians, especially interns, learnt from their senior counterparts during clinical handover sessions (see Section 4.3.2.1). This understanding then translated into the expectations that clinical handover should allow for interns to present and then learn from feedback obtained from the registrars and consultants.

REG C: *It's bad when some of the interns do their little handovers quietly up the other end of the table while the reg's are presenting cases because I think they miss out on hearing how cases should be presented or not presented – either way – and miss that educational opportunity.*

INT M believed that the role of an intern in patient management was minimal and therefore involvement in clinical handover was not too important. Therefore, INT M's expectations of clinical handover were minimal. He did not think that it was important practically although he recognised its importance theoretically. He did not think that it affected his ability to do his job.

INT M: *Because when you are an intern, you are not making a lot of the decisions, you are just following, it just doesn't ... it is not as important in a practical sense. I think in a theoretical sense, when you are designing a good model, it would seem important. But, I don't think it affects my ability to work very much at all....*

EXPECTATIONS was strongly influenced by affected by *UNDERSTANDING* (see Section 4.3.2.1) and moderately influenced by *INDIVIDUAL PERSONALITIES* (SEE SECTION 4.3.2.3) AND *CULTURAL BACKGROUND* (see Section 4.3.2.5).

4.3.2.3 Individual personalities

A participant's personality manifested as their behaviour. From analysing the interview transcripts, this subtly is embedded within the words and anticipated actions or responses of the participants. Observation sessions revealed that a participant's personality played a significant role in clinical handover. As such, the axial code *INDIVIDUAL PERSONALITIES* had a strong influence on *BEHAVIOUR*. *INDIVIDUAL PERSONALITIES* also had a moderate influence on *EXPECTATIONS* and a strong influence on *COMMUNICATION STYLES*.

The strong influence of *INDIVIDUAL PERSONALITIES* on *BEHAVIOUR* is best illustrated by INT C who related what happened at a clinical handover session. To provide some context to the interview excerpt below, the consultant that INT C was referring to was viewed by many as having an abrasive personality and was thought of by some as rude. She had a habit of locking the door once she arrived and left immediately once she had obtained all the relevant handover information about her patients. This consultant did not agree to participate in this research.

INT C: Yeah, I think once or twice it has been, or times have been, or the door has been locked at 08:00 so that the late people can't get in. That's probably not been that helpful. It did have an effect because it did mean people, at least someone knew she was on, will be on time, but often you are just in the other room, getting something, you know. Locking the door at 08:00 on the dock is possibly just Well, I think what it means is that she has handed over anyway. It is just, it is just not, and you just need to find out yourself. Sounds a bit counter-productive.

INT C was very frustrated by that event. The above statement clearly illustrates the relationship of *INDIVIDUAL PERSONALITIES* of one key person in handover affecting the *EXPECTATIONS* and *BEHAVIOUR* of others. This was however not brought up by any of the consultants. Consultants viewed leadership as impacting on the expectations of handover.

CON H: I think if the consultants not engaged and doesn't go and doesn't make it ah a big priority then I think the whole thing will fall over um it needs commitment at the top in inverted commas. And it's also the individual with the most experience and will hopefully ask most of the ah you know who can lead it and have the authority to ask people what's going on or to question what they are saying and to bring out hopefully you know the gaps of it

From a consultant's perspective the most important aspect in *INDIVIDUAL PERSONALITIES* was that of leadership. The consultant viewed himself as the person with the most experience and authority to question the junior clinicians. This had direct impact on the *BEHAVIOUR* of junior clinicians during clinical handover as while they did participate, they were not fully engaged in the handover process.

INDIVIDUAL PERSONALITIES strongly influenced *COMMUNICATION STYLES*. The personalities of the consultant and the clinical handover project registrar were particularly significant as participants were working in a very hierarchical environment and tried to model their behaviour according to their senior counterparts. They changed the way that they communicated and also the way that they presented information according to the personalities of their consultants and their clinical handover leader. This is illustrated by an interview excerpt from REG C and INT E.

REG C: People present differently depending on who's listening such as if CON J's on, handover is quite brief to the registrar where as if say CON Ni or CON F are on you go into a lot more So for CON F if someone came in with a fall I'd talk about it for a lot longer and in a lot more detail than I would say CON Ni.

INT E: personality of the consultant or the way they Yeah, there is a particular consultant who likes to hear the new patients in a very quick manner and then go, leave straight away... then there is others, who, who, umm..yeah.. like, every new patient presented to them, they will manage to find something to talk about, or just, just quickly comment on something that the rest of us will go, like something medical that could be useful..

The quote from INT E not only revealed that *INDIVIDUAL PERSONALITIES* had a strong influence on *COMMUNICATION STYLES*, but also that *COMMUNICATION STYLES* had a strong influence on *BEHAVIOUR*.

4.3.2.4 Communication styles

Observation sessions conducted revealed that different participants had different communication styles. Some participants were succinct and to the point while others liked to provide very detailed information. The differences in communication styles were best captured by REG A who thought that communication styles did not impact much on clinical handover.

REG A: *Some people like to present things in a very chronological order and sequence, some people just like to present the issue, ah, I think in the end if you're fairly sure of your assessment or things fit into a nut shell there is no need to elaborate, it does happen when sometimes the consultant will ask questions want some clarification, so the style doesn't really affect it much, the consultants seem to be very flexible to the different styles,*

Other participants disagreed with that. According to INT R, communication skills and communication styles had a significant impact on the outcomes and behaviours of participants during and after handover. This was confirmed by the observation sessions that *COMMUNICATION STYLES* did strongly influence *BEHAVIOUR* during clinical handover sessions.

INT R: *people who are involved, like the people who have done the admitting, they are handing over to, handing over information to someone else. Their communication skills, play a big role in whether or not the handover is effective, then you may be actually coming away from it thinking, yeah, well, I am pretty sure that I know what has been done so far and or Oh, shit, with these patients, well, you just go, you didn't really understand what the hell was happening*

COMMUNICATION STYLES were also strongly influenced by *CULTURAL BACKGROUND* (see Section 4.3.2.5).

4.3.2.5 Cultural background

There were many International Medical Graduates who worked in the Department of General Internal Medicine. These International Medical Graduates are culturally diverse and it was important to take into consideration the cultural background of the participants in this research.

CULTURAL BACKGROUND strongly influenced *UNDERSTANDING*. Observation sessions revealed that the cultural background of a participant influenced the understanding of clinical handover as a mechanism to ensure continuity of patient care and information transfer. It appeared that participants from some cultural backgrounds are more meticulous about clinical handover while participants from other cultural backgrounds did not appear to recognise that handover was important.

CULTURAL BACKGROUND strongly influenced *EXPECTATIONS*. It was observed that participants often based their expectations of handover on the cultural background of the registrar transferring the information. For example, one intern made a comment to the researcher during one of the handover sessions that it was going to be a short handover as that particular registrar was only there to obtain the information and nothing else.

CULTURAL BACKGROUND strongly influenced *COMMUNICATION STYLES*. This was highlighted by CON N who indicated that international medical graduates are not as concise in presenting clinical handover information.

CON N: *There seems to be a clear, not necessarily language barrier but overseas graduates at least in the local experience here seem to not be able to, sorry I should say they have less developed skills in condensing the presentation so they tend to be over inclusive*

CULTURAL BACKGROUND strongly influenced *BEHAVIOUR*. The researcher observed that participants changed their behaviour during clinical handover based on the cultural background of the person presenting or leading the handover. It was obvious to the researcher that a particular group of clinicians switched off completely and started their own discussions when another clinician of a

different cultural background was presenting. Some even walked out of the handover room to get a drink. Although these behaviours were obvious to the researcher, participants did not bring this up in their interviews.

4.3.2.6 Behaviour

A participants' behaviour during clinical handover was extremely important in ensuring the goals of clinical handover were achieved.

BEHAVIOUR was influenced by *UNDERSTANDING* (see Section 4.3.2.1), *EXPECTATIONS* (see Section 4.3.2.2), *INDIVIDUAL PERSONALITIES* (see Section 4.3.3.3), *COMMUNICATION STYLES* (see Section 4.3.2.4) and *CULTURAL BACKGROUND* (see Section 4.3.2.5).

4.3.2.7 Preliminary findings from core category PARTICIPANT ATTRIBUTES

Table 7 provides a summary of the unilateral relationships between axial codes in the core category PARTICIPANT ATTRIBUTES.

The axial code	Influenced the axial code	Phase One
Understanding	Expectations	Strong
	Individual personalities	-
	Communication styles	-
	Cultural background	-
	Behaviour	Strong
Expectations	Individual personalities	-
	Communication styles	-
	Cultural background	-
	Behaviour	Strong
	Understanding	-
Individual personalities	Communication styles	Strong
	Cultural background	-
	Behaviour	Strong
	Understanding	-
	Expectations	Moderate
Communication styles	Cultural background	-
	Behaviour	Strong
	Understanding	-
	Expectations	-
	Individual personalities	-
Cultural background	Behaviour	Strong
	Understanding	Strong
	Expectations	Strong
	Individual personalities	-
	Communication styles	Strong
Behaviour	Understanding	-
	Expectations	-
	Individual personalities	-
	Communication styles	-
	Cultural background	-

Table 7: Summary of relationship between axial codes in core category PARTICIPANT ATTRIBUTES

The following presents the preliminary findings from the core category PARTICIPANT ATTRIBUTES:

1. Participants had a different understanding of clinical handover depending on their roles in patient care and within their role in patient care (see Section 4.3.2.1). This variability in

understanding led to differences in expectations and behavior during clinical handover (see Section 4.3.2.1)

2. Participants' individual personalities not only influenced their own communication styles but that of others, their own behavior and other participants' behaviours and also their own expectations and the expectations of others at clinical handover (see Section 4.3.2.3).
3. A participant's communication style strongly influenced the behavior of other participants during clinical handover (see Section 4.3.2.4).
4. Cultural background appeared to play a very important role in clinical handover as it had strong influences on the participant's understanding, expectations and that of others and behavior and the behavior of others (see Section 4.3.2.5).
5. A participant's behavior at clinical handover was central in ensuring that the goals of clinical handover were achieved. A participant's behavior at clinical handover was influenced by understanding, expectations, individual personalities, communication styles and cultural background. It was the interplay amongst these factors which determined the behavior of a participant at each handover session (see Section 4.3.2.6).

4.3.3 Environmental considerations

ENVIRONMENTAL CONSIDERATIONS was the third core category identified in Phase One and refers to the environment in which clinical handover is being conducted as well as environmental factors which impact on clinical handover.

There are five axial codes associated with this core category. These axial codes are defined as follows:

- *WORKLOAD* refers to the amount of work that a participant has to complete within their shift.
- *VENUE* refers to the physical location in which clinical handover is conducted
- *DISTRACTIONS* refers to anything that diverts the participant's attention during handover
- *NUMBER OF PARTICIPANTS* refers to the total number of participants present at handover
- *TEAM DYNAMICS* refers to how the interns, registrars and consultants work together as a team to provide patient care.

Figure 16 provides an illustration of the relationship between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

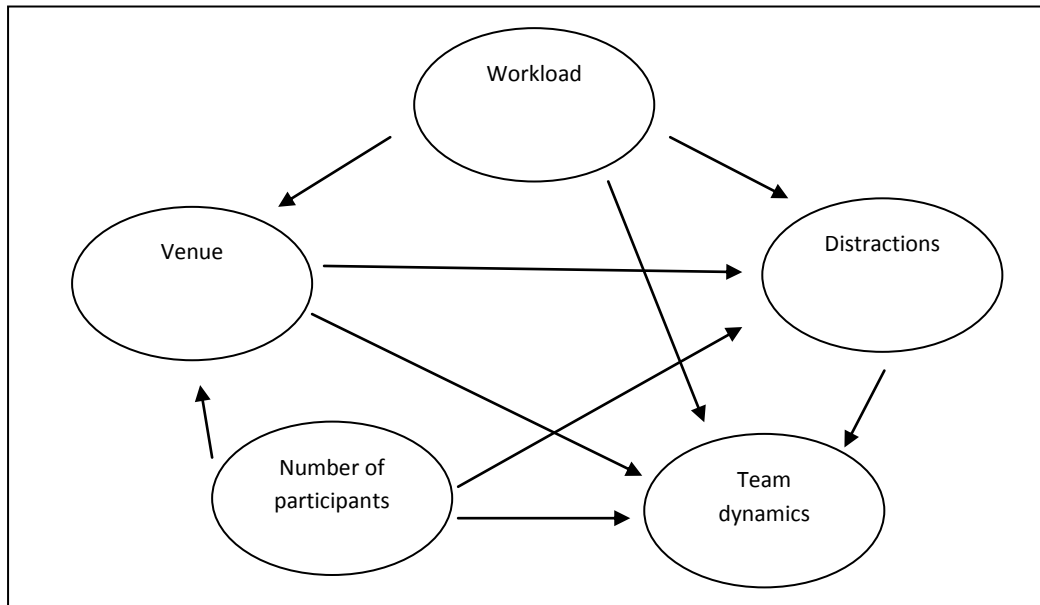


Figure 16: Relationship between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS

WORKLOAD strongly influenced *TEAM DYNAMICS* and *DISTRACTIONS* and moderately influenced *VENUE*.

NUMBER OF PARTICIPANTS moderately influenced *DISTRACTIONS*, *VENUE* AND *TEAM DYNAMICS*.

DISTRACTIONS strongly influenced *TEAM DYNAMICS*.

4.3.3.1 Workload

The researcher initially coded time and workload as two different axial codes. This was because time was often brought up by the participants as a very important environmental factor which impacts on clinical handover. However, upon further analysis, the researcher found that the two were interrelated as time was only an issue if the participants have a heavy workload. These two codes were therefore merged together.

The strong influence of *WORKLOAD* on *VENUE* was revealed through observations of clinical handover sessions. Participants did not appear to be aware of this relationship. If the workload was heavy, very often the handover was conducted somewhere other than the designated handover room. Often, the incoming team would congregate in the designated handover room. If the outgoing team did not turn up after some time, the incoming team would attempt to locate the outgoing team via their pagers. Once contacted, members of the outgoing team would either come up to the designated handover room or more often than not, handover would be conducted somewhere else, for example, in the clinical area or the corridors.

The researcher also observed that during a shift with a very heavy workload, the outgoing team was also more likely to arrive from their clinical work and slump in front of the couch and indicate that they were tired both verbally and non-verbally. They would then start handover discussions informally by indicating how busy the shift was and then proceed with the actual handing over of

patient information. This was also a time when peer support was evident when their peers listened to them talk or complain about their shift.

The researcher noticed that added workload at handover time impacts on the clinical handover session and team dynamics. A code blue (medical emergency) was called during one of the clinical handover sessions. As a result, the on-take team had to leave the handover to provide support for the patient who had a cardiac arrest. When they returned, all the other participants had already left and a short note about each patient was left in the handover room.

WORKLOAD strongly influenced *TEAM DYNAMICS* and could be a source of *DISTRACTIONS*. Firstly, if the shift prior to handover had a heavy workload, participants on that shift would have less time to prepare for handover and they are more likely to leave without doing a proper handover. This point is clearly demonstrated by INT E.

INT E: *because it is intended to be a fixed time, so, you know, especially in the evening, 9:30-10, but you ability make it there to make a proper handover, it is strongly influenced by what's happening on the ward. and then, people want to leave as soon as they can, so... you know, you have just done a long shift, and, you actually just want to quickly sort of passed that on and then leave*

INT V agreed that workload was an important issue. INT V did not attend many handovers due to her workload. While INT V understood that she should attend handovers, she saw her tasks on the ward as more important. Her interactions with the night intern affected the handover process as well as team dynamics.

INT V: *Umm... personally, I actually missed a lot of the afternoon handovers. Because I have been due on the wards, which I know is not very good, and then therefore I do a handover directly to the intern on.*

This is further supported by INT L who indicated that workload, especially jobs that had to be done close to clinical handover time was very important in impacting on clinical handover. Most interns did not want to handover their jobs. Instead they would prefer to complete their jobs and provide a short handover. This revealed that interns gave completion of tasks in a ward a higher priority than attending clinical handover.

INT L: *In that normally you got to do handover, and you kind of look at the watch and oh my god, it is five to five and you got up there and you generally think, I got to do that job before I go home as well, you know, do that job and then it is five past five and you kind of don't want to be at work much longer than you, you know that you got to handover, you know, you sort of cut it down to the patients who critically need, sort of need handover.*

Secondly, if the incoming team perceived that they had a heavy workload, they were more likely to want to leave the handover session as soon as possible in order to get on with their work. That affects the clinical handover session, not only from the incoming team's perspective but also affects the team dynamics at handover.

INT C highlighted that the team is likely to want to leave early if they have a heavy workload resulting in workload being a source of distraction. This will impact directly on the interactions between the two teams at clinical handover. Distractions, however, did not happen frequently during the observation. As such, *DISTRACTIONS* had a moderate relationship with *WORKLOAD*.

INT C: I suppose the other thing that certainly affect clinical handover is the workload that each team has, they are more likely to want to leave early (for ward rounds) if they have a lot of patients.

4.3.3.2 Venue

There was a designated clinical handover room and the layout of that room is illustrated Figure 6). There were two entrances to the room, one at the front of the room and the other at the back. This allowed for participants who came in late to enter the room with minimal disruptions to handover. The two doors however also created distractions by allowing non-participants of handover to enter the room during handover time. This not only affected the dynamics of handover but also disrupted handover. This was especially a problem given that the computers and a printer were located in the handover room. This was the only room with a printer in the resident's quarters. Other clinicians therefore needed to access this facility. This handover room also had windows facing a major road which was extremely busy and noisy. Therefore, *VENUE* had a strong relationship to *DISTRACTIONS*.

Despite the researcher making these observations, the participants seemed to think that the handover room was adequate. INT L mentioned that the room was adequate but also did indicate that it could be improved as many people can't get into the room or have to sit in a corner without participating in handover. INT L thought that the room was adequate because she wanted access to computers and she could multi task while handover was being conducted in that room. This also highlighted the relationship between *VENUE* and *DISTRACTIONS* (the computer).

INT L: Umm... I think the room up here is adequate, could be a bit bigger I guess. Because often people just can't get in or sitting at the corner and can't hear. ... it is good being there where you get computers as well, because of often in the morning, I will be getting results and kind of half listening as well

The researcher also in her observation sessions found venue to be important as it impacts on team dynamics. When clinical handover was conducted in the handover room, there was an implied seating arrangement which facilitated the handover process. While this seating arrangement had never been formalised, the tradition of clinical handover at the Department of General Internal Medicine dictated that the consultant was usually the person at the end of the table with the registrar sitting just beside the consultant. The rest of the team would then take their places at one side of the table. The outgoing team would be seated on the opposite side of the table also with the registrar sitting closest to the consultant. This facilitated discussions during handover between the outgoing team and the incoming team. The researcher also observed that when handover occurred in areas other than the clinical handover room, seating was a lot more informal and spaced out and sometimes does not facilitate group discussions. This was not reflected in the interviews conducted. Participants appear to be unaware of the impact of *VENUE* on *TEAM DYNAMICS*. For example, REG A believed that handover can be conducted anywhere, as long as the participants involved could hear each other.

REG A: Actually we do it anywhere- like sometimes we do it over in the kitchen, I don't really think, as long as you can hear each other I don't think it really matters, you know no noise or distraction, I don't think it really matters where it happens.

VENUE was influenced by WORKLOAD (see Section 4.3.3.1) and NUMBER OF PARTICIPANTS (see Section 4.3.3.4).

4.3.3.3 Distractions

During the observation sessions, the researcher found that distractions could be internal (within the participant's control) or external (outside the participant's control). Internal distractions included having breakfast during handover, discussions with other team members during the formal handover session and engaging in other activities such as printing out-patient lists. External distractions included noises from outside the handover room, individuals watching television, mobile phones and pagers going off and workload.

Participants appeared to be more frustrated with external distractions as they felt they could better control and minimise the impact of internal distractions. DISTRACTIONS strongly influenced TEAM DYNAMICS. INT C mentioned that she printed patient lists and did "side handovers" with colleagues during formal handover sessions. Participants appeared to minimise the impact of distractions on team dynamics and clinical handover.

INT C: There are probably a few things that are quite distracting at handover. I do and every one does, like printing out list and getting my little side handovers from the intern just directly to you while the main handover is going on, sometimes is, would be better not to have those kind of things at times, it does distractive the main kind of presentation.

INT E indicated that she understood why people had to have breakfast at handover but was extremely annoyed when she was paged for non-urgent matters during handover.

INT E: I understand the breakfast thing, that's fine and it is extremely annoying if you get paged about a non-urgent issue at handover.

INT V also thought that external distractions were significant in impacting on team dynamics during handover. In INT V's experience, her colleagues would prefer to watch television rather than listen to what she had to say about a particular patient. This reinforced the relationship between VENUE and DISTRACTIONS.

INT V: And at night I think the handover should be moved from the TV room, because when, I have a few times, when I wanted to discuss a patient, people are too glued to the television...

While the researcher found that both internal and external distractions affected team dynamics in the same manner, participants seemed to place a heavier emphasis on external distractions.

DISTRACTIONS was moderately influenced by WORKLOAD (see Section 4.3.3.1) strongly influenced by VENUE (see Section 4.3.3.2) and moderately influenced by NUMBER OF PARTICIPANTS (see Section 4.3.3.4).

4.3.3.4 Number of participants

The researcher observed that the number of participants varied at handover sessions. NUMBER OF PARTICIPANTS moderately influenced VENUE. Morning handover sessions were usually held in the designated clinical handover room as it had the most number of participants. During observation sessions, there was anywhere between fifteen to twenty participants. It was a requirement that

the post-take consultant, all medical interns, residents, registrars and sub-specialty registrars attend morning handover. Evening and night handovers consisted of few participants and participants tended to arrive at handover at different times. Evening and/or handovers were usually held in a smaller area such as in front of the television which could be distracting.

It was also noted that just because participants were present at handover, especially morning handovers sessions, it did not necessarily mean that they contributed to clinical handover sessions. Some participants were there purely because they were told to do so and did not take on an active role.

NUMBER OF PARTICIPANTS moderately influenced *DISTRACTIONS*. INT E indicated that she was annoyed by the number of people present at morning handover as this seemed to cause distractions and create a chaotic environment impacting on team dynamics. This demonstrates the relationship between *NUMBER OF PARTICIPANTS* and *TEAM DYNAMICS*.

INT E: just I was annoyed at the amount of people, like in the morning, like the 8 am handover is sometimes chaotic, because you got a lot of people and yap, can easily get distracted

The same point was raised by INT R who mentioned that handovers were more focused when there were fewer people. If there were many people in the handover room, participants often attempted to handover at the same time and this affected the team dynamics.

INT R: I guess the number of people as well, on the weekends, quite often, there are only a couple of, a few people around, it tends to get much more focused and succinct as supposed to when you got a whole group of, you know four or five medical teams and they are all, after busy period of admission, handing patients back to one another.

NUMBER OF PARTICIPANTS moderately influenced *TEAM DYNAMICS* if they had a role to play at handover. INT V indicated that a specialty registrar can contribute significantly to the Department of General Internal Medicine's handover.

INT V: The morning handover is the most structured of any of the handovers. And it is probably because of the time that it is, and the time of the day that it is, and because the consultants do often come. Am... Because everyone is there, like including people like gastro, cardiology, and sort of access to all those consults would be nice to talk to ...

4.3.3.5 Team dynamics

Both the outgoing team and the incoming team needed to work together to ensure that good handover occurred. As stated by INT S, the outcomes of handover were determined by the team as the team can impact on the participants giving or receiving a good handover.

INT S: Or, It is more from the rest of the team, it can prevent you from handing over or giving a good handover.

The presence of a leader also improved *TEAM DYNAMICS*. Without a leader, handover could become chaotic.

INT E: some sort of leadership. like, Am...There are plenty of days, which like it is obvious who is running it and there is other days that, you know, key features aren't there

TEAM DYNAMICS was strongly influenced by *WORKLOAD* (see Section 4.3.3.1) and *DISTRACTIONS* (see Section 4.3.3.4) and moderately influenced by *VENUE* (see Section 4.3.3.2) and *NUMBER OF PARTICIPANTS* (see Section 4.3.3.3).

4.3.3.6 Preliminary findings from core category ENVIRONMENTAL CONSIDERATIONS

Table 8 provides a summary of the unilateral relationships between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

The axial code	influenced the axial code	Phase One
Workload	Venue	Strong
	Distractions	Moderate
	Number of participants	-
	Team dynamics	Strong
Venue	Distractions	Strong
	Number of participants	-
	Team dynamics	Moderate
	Workload	-
Distractions	Number of participants	-
	Team dynamics	Strong
	Workload	-
	Venue	-
Number of participants	Team dynamics	Moderate
	Workload	-
	Venue	Moderate
	Distractions	Moderate
Team dynamics	Workload	-
	Venue	-
	Distractions	-
	Number of participants	-

Table 8: Summary of relationship between axial codes in core category ENVIRONMENTAL CONSIDERATIONS

The following presents the preliminary findings from core category ENVIRONMENTAL CONSIDERATIONS.

- Workload was a key consideration as to whether clinical handover sessions happened and if they happened on time (see Section 4.3.3.1). It also affected the team dynamics and could be a source of distraction at clinical handover sessions (see Section 4.3.3.1).
- The choice of venue determined if there were any distractions and the type of distractions (see Section 4.3.3.2)
- Distractions both internal (within the participants' control) and external (outside of the participants' control) affected the quality of the handover but it was the external distractions that appeared to affect the participants more (see Section 4.3.3.3).
- Number of participants appeared to be a key consideration in the quality of clinical handover conducted as it influenced the venue chosen and could be a major source of distraction if participants did not contribute to the handover sessions (see Section 4.3.3.4)

4.3.4 Clinical handover experiences

CLINICAL HANDOVER EXPERIENCES was the fourth core category identified in Phase One and refers to the participant's practical experiences of being involved in clinical handover at the Department of General Internal Medicine. The initial coding process classified these into two

separate codes - functions of handover and process of handover. After further analysis, the researcher decided that the two codes be merged as handover experience as the focus of this thesis was to understand clinical handover from a participant's perspective.

There are six axial codes associated with this core category. These axial codes are defined as follows:

- *ATTENDANCE* refers to the participant's physical presence at clinical handover.
- *SUPPORT* refers to clinical handover sessions being used as a means for personal well-being and professional development.
- *EDUCATIONAL COMPONENT* refers to clinical handover sessions being used to provide education and training in patient care for the participants.
- *STRUCTURE* refers to the format of the clinical handover session. This includes the order of proceedings and agenda during a clinical handover session.
- *INFORMATION TRANSFER* refers to the process of passing patient information from one person to another or one team to another. It also refers to the content of information that is passed on.
- *CLINICAL HANDOVER OUTCOMES* refer to whether the clinical handover process has delivered on the pre-designated goals and aims.

Figure 17 provides an illustration of the relationship between axial codes in the core category *CLINICAL HANDOVER EXPERIENCES*.

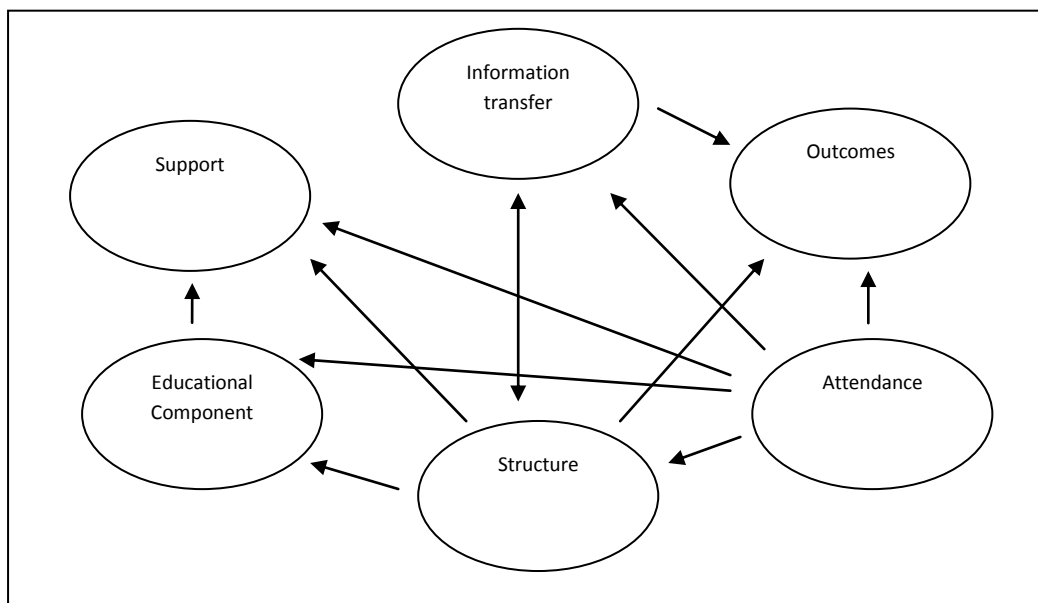


Figure 17: Relationship between axial codes in the core category *CLINICAL HANDOVER EXPERIENCES*

ATTENDANCE strongly influenced *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE* and moderately influenced *CLINICAL HANDOVER OUTCOMES* and *INFORMATION TRANSFER*.

EDUCATIONAL COMPONENT strongly influenced *SUPPORT*.

STRUCTURE moderately influenced *INFORMATION TRANSFER*, *CLINICAL HANDOVER OUTCOMES*, *SUPPORT* and *EDUCATIONAL COMPONENT*.

INFORMATION TRANSFER strongly influenced *CLINICAL HANDOVER OUTCOMES* and moderately influenced *STRUCTURE*.

4.3.4.1 Attendance

The code *ATTENDANCE* refers to the participant's physical presence at clinical handover sessions at a specified time and venue.

According to the clinical handover guidelines disseminated in 2005, all relevant clinicians were required to attend morning handover sessions (see Figure 18).

<p><i>Expected participants</i></p> <ul style="list-style-type: none">• <i>All general medical interns and registrars</i>• <i>Evening and night medical seniors</i>• <i>Night intern and night medical registrar</i>• <i>Post-take consultant physician</i>• <i>Advanced trainees in medicine specialties</i>
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Figure 18: Excerpt of Clinical Handover Guidelines 2006 (Expected participants at handover)

However, interviews with participants provided a very different picture. Participants did not always necessarily attend clinical handover. An extreme example to illustrate this difference is the case of CON J. CON J was a well-respected senior consultant who had worked for many years in the Department of General Internal Medicine. CON J, however, did not see it as his role to attend clinical handover.

CON J: *it is something that the resident staff do among themselves. So it is basically a transfer of information among the staff.*

ATTENDANCE strongly influenced *SUPPORT*. This was especially so when consultants and registrars attended clinical handover. When the consultants were present, they often provided advice on patient management as well as general advice in dealing with patient issues. When the consultant was not available, some registrars would step in and give advice where needed. However, at times when both the consultant and registrar were not available e.g. evening or night handovers, interns found it hard to discuss cases without proper guidance.

Attendance strongly influenced *EDUCATIONAL COMPONENT*. If a consultant did not attend clinical handover, he/she was not available at handover to deliver the educational component which in turn affects the junior clinicians' opportunities for education. CON J's opinion was that clinical handover should not be used as a teaching session. It should be only a transfer of information to enable him to commence his duties.

CON J: *I don't believe it should be a teaching session, I believe that it should be a handover, and I want to start my ward round at half past eight*

ATTENDANCE strongly influenced *STRUCTURE*. INT S stated that handover never really happened in the format in which it was supposed to happen. The attendance of staff determined the structure of handover and it might occur in the corridor or anywhere where the participants meet.

INT S: *It kind of really never happened, you sort of someone needs to find you and handover something to you, and then you Ok get it. But, there is no actual specific time.*

INT M stated that attendance of handover by a consultant influenced the structure of handover. When there was no consultant present, junior clinicians did not provide a structured handover to the next team, only discussing the patients who had the potential to deteriorate.

INT M: *when there is no consultant, you are not presenting patients that you have already admitted, because it really has, unless there is a specific worry about them.*

This view however was not shared by some other participants. The relationship between *ATTENDANCE* and *STRUCTURE* appeared to be dependent on team dynamics rather than individuals. Sometimes, a registrar was willing to step up or take the initiative to lead the clinical handover session.

REG R: *the absence of a consultant or even if the consultant is there and the consultant doesn't really have any initiative or much to do with the number of patients other units have, they're just there to receive the patients and that's it, the registrars should actually be the leader*

The perception of the structure of evening and night handovers amongst interns were shared by registrars. From the observation sessions, registrars did not seem to attend evening handovers at all. Registrars viewed the evening and night handovers as different to the morning handover in that it was more between registrars and did not tend to involve the interns. An example of this is provided by REG G.

REG R: *No that doesn't happen at all, for example for me if I have something to handover to the team on take I just call, it's a personal handover I handover to the reg.*

REG R: *It's more of a person to person thing: the reg hands over to the reg and the intern hands over to the intern.*

This was supported by other participants and it should be noted that *ATTENDANCE* might have an influence on *CLINICAL HANDOVER OUTCOMES*. An example of the influence of *ATTENDANCE* on *CLINICAL HANDOVER OUTCOMES* was demonstrated by INT L who expressed concerns that the lack of attendance could mean patient care not being delivered.

INT L: *Sometimes it doesn't happen though and sometimes, you don't hear about until the next day when you, when you could have done it.*

There is a complex relationship between *ATTENDANCE* and *INFORMATION TRANSFER*. In some cases, it seemed like that the transfer of information was not significantly affected by the participants' attendance while in other cases, it seemed like information transfer was significantly affected. A consultant's presence did not appear to significantly impact on information transfer as another participant (usually the registrar) could take on that role to ensure that the information was transferred at clinical handover. This view was supported by CON J1 who indicated that clinical handover involved the team and the information could still be transferred if there was a registrar present.

CON J1: *I think its more of a group they actually sign off to me and the registrar that will be working with me and both of us I mean all three of us basically discuss what was happening.*

A similar view was expressed by REG R on the role of registrars in ensuring information transfer in the absence of consultants.

REG R: *I think the receiving team should lead the handover and when the consultant is not around the receiving registrar should.*

This process was very different from an intern's perspective. Information transfer between interns was highly dependent on their presence at clinical handover. INT L expressed concerns that at times, poor attendance at handover by some colleagues might have resulted in the lack of information transfer.

INT L: *Yeah, some people don't turn up to handover or if you don't happen to run across one of them then, it could be missed*

From the observation sessions, the researcher found that there were complex interactions inherent within the Department of General Internal Medicine. The impact of the lack of attendance at clinical handover sessions is mitigated by other communication mediums for example patient notes, nursing staff, telephones which assisted with information transfer.

4.3.4.2 Support

During the observation sessions, the researcher found that clinical handover sessions were commonly used by the participants to seek advice, direction and supervision from their senior counterparts. In addition, participants often used clinical handover sessions to provide support to one another through difficult shifts. The evening and night handover sessions were also often used as a time for debriefing and de-stressing. Interns and registrars often used handover as an opportunity for professional development through a process of peer review and seeking second opinions.

This observation is supported by the clinical handover guidelines (see Appendix 1) which allowed time for participants to discuss cases and to present patients of concern during handover. Interviews with the participants however very rarely identified these functions of handover.

CON H was the only participant who brought up this aspect of clinical handover. According to CON H, handover was thought to be an important opportunity for supervision and feedback of junior staff. Consultants saw that providing feedback to the junior clinicians in terms of what actions were undertaken for patients under their care was best carried out at handover when the case has just been discussed.

CON H: *it's very important people getting feedback cause I you know we want the best that we can get and I think by making it known that there's constant education and training and there will be feedback as handover is a great place to train.*

Support during clinical handover was more than just supervision from senior clinicians. There was also a significant element of peer support. Handover provided interns and registrars with an opportunity for debriefing and de-stressing after a stressful shift. Handover often had an element

of social interactions injected with some humour. This provided all participants with a coping mechanism to deal with the uncertainties and stresses in a highly demanding working environment. The only participant who mentioned this was CON H.

CON H: *I like meeting the junior docs because you know they're a fun group. Obviously doctors shouldn't be having jokes at this point but there's an element of humour there people always make comments across the table and I've always enjoyed that sort of stuff and I'll you know join in the banter without it deteriorating and getting silly.*

Although this aspect of clinical handover experience was observed on a regular basis, participants did not bring up this aspect as part of their clinical handover experience.

SUPPORT was influenced by *ATTENDANCE* (see Section 4.3.4.1), *EDUCATIONAL COMPONENT* (see Section 4.3.4.3) and *STRUCTURE* (see Section 4.3.4.4).

4.3.4.3 Educational component

Education and training in the clinical environment was largely based on the apprenticeship model and handover was seen as an important educational opportunity. Handover provided an opportunity for interns, residents, registrars and consultants to get together to discuss patient management issues and also learn about communication and presentation techniques. The researcher observed that this aspect of clinical handover experience was highly valued by the junior clinicians. Whenever there was some form of teaching going on, the participants would listen intently to discussions.

EDUCATIONAL COMPONENT strongly influenced *SUPPORT*. This aspect of clinical handover experience was highly regarded by clinicians of all seniorities. They perceived the importance of this not only for their own education and training but also for better patient care.

INT V: *I think it should also be more of a learning experience, so that you are actually discussing management of these patients.*

While the registrars also learn and benefited from the education sessions, REG R perceived that this was more important for interns but indicated that these education sessions were rare.

REG R: *I guess my idea of clinical handover would be since it's attended by interns who are rotating in medicine, it should be more teaching based.*

REG R: *Sometimes depending on the consultant they do inject some learning, they ask question and yes depending on the consultant they actually offer some clinical pearls but then that happens rarely.*

CON H thought that there should be an educational component in handover, especially through the discussion and presentation of patients during handover.

Con H: *Um I think there should also be as a part of it um an educational component so that people that have been particularly out of hours, clerking and doing hard work are given the opportunity to ah both ask questions but also ask some feedback on the quality of the data they're presenting.*

While it has been acknowledged that an educational component in handover was important, there should be some flexibility in the structure and duration of handover to provide an opportunity for education.

REG R: *I think it's primarily because it's only from 8 to 8.30 and you want things to be done and want to get things done in the morning and people just want it over with so they can get on with their work.*

EDUCATIONAL COMPONENT was influenced by *ATTENDANCE* (see Section 4.3.4.1) and *STRUCTURE* (see Section 4.3.4.4).

4.3.4.4 Structure

The clinical handover guidelines and clinical handover manual had provided a clear structure to clinical handover sessions. This structure included which clinicians were expected to be present at various clinical handover sessions and the order of proceedings during each clinical handover session. The clinical handover manual also provided indication as to which clinicians had to be present at the various clinical handover sessions (see Figure 19).

Responsibility to accept handover

It is the responsibility of the incoming team to receive and accept handover. Therefore, it is expected the incoming team to be present at the following time to receive clinical handovers.

- Morning 08:00 to 08:30, all general medical registrars, interns, weekend medical seniors.
- Evening 16:30 to 17:00, the evening intern, and preferably the evening registrar
- Night 21:30 to 22:00, both evening interns, registrar and medical senior.

These handover sessions for the Department of General Internal Medicine take place in the 5th floor tutorial room.

Figure 19: Clinical Handover Manual (Handover times)

The proceedings for morning handover (see Figure 20) were presented in a large poster available in the clinical handover room. The researcher was told that all new staff starting their rotation at the beginning of the year were made aware of the structure.

<u>Clinical handover order of proceedings</u>	
STEP 1.	Establish the clinical handover leader.
STEP 2.	“Capping” system
	<ul style="list-style-type: none"> i. Establish patient numbers of “on-take” units, and each unit. ii. Highlight if the “CAPPING” system to be activated. iii. Refer to the “CAPPING” guideline for patient allocation.
STEP 3.	Highlight definite or potential consults to advanced trainee.
STEP 4.	Night registrar
	<ul style="list-style-type: none"> i. To present cases which might need specialty input first. ii. Other new admissions. iii. Consultations from wards.
STEP 5.	Medical senior
	<ul style="list-style-type: none"> i. Night medical senior to present admissions to be “handed back” under the 12 months guidelines. ii. Evening medical senior. iii. Please state the UNIT, CONSULTANT, WARD, URN clearly at the beginning of the presentation.
STEP 6.	Night interns and potential consults.
	<ul style="list-style-type: none"> i. Issues on the ward overnight, especially unstable patients.
STEP 7.	Unknown or incorrectly listed patients
	<ul style="list-style-type: none"> i. Each unit to check and notify “unknown” patients or “incorrectly listed” patients.
STEP 8.	Mortality within the last 24 hours.
	<ul style="list-style-type: none"> i. Report of mortality within the last 24 hours (or over the weekends). ii. Please report the unit and URN of the patient. iii. Reminder to interns to forward the case notes to Department of General Internal Medicine.
STEP 9.	Notices
	<ul style="list-style-type: none"> i. Staff absence to be reported. ii. Reminder for meeting scheduled for the day. iii. Other notices or issues arising.
Note for Monday	
<ul style="list-style-type: none"> • Start with handbacks from Friday on-take unit, followed by Saturday and Sunday handbacks, and then follow the above agenda. 	

Figure 20: Agenda for morning handover

Interviews with the participants revealed that the structure of clinical handover was not always in accordance to the manual provided by the Department of General Internal Medicine. While CON N described handover as an orderly event that occurred at the same time at the same place every day in which everyone participated accordingly, this view was not shared by many.

CON N: *A predetermined time that occurs at the same time every day in a quiet uninterrupted environment during which staff involved in patient care and it doesn't have to just be doctors it can involve other people, yes in which those group of people involved in patient care provide concise, clear and relevant information pertaining to patients under their care or that have been reviewed by them.*

CON N was a senior consultant in the Department at the time this interview was conducted and was responsible for putting together the structure for clinical handover. Interns and registrars however did not share this view. INT S for example felt that the handover structure did not allow for active participation and could be a waste of time.

INT S: *while it is interesting with some of the patients, with the others, you just have to sit around and wait, and it can be a waste of a time*

Registrars also were concerned that the structure of clinical handover wasted their time.

REG A: *I think it works pretty well when you are the receiving team, it just bogs you down when it takes a while and you are waiting for something to be handed over to you and you're just wasting 15 or 20 minutes waiting for your turn.*

While participants did not appear to follow the pre-defined structure for morning handover, evening and night handovers appeared to be even more unstructured according to several interns.

INT C: *Handover has been quite structured throughout the year in terms of the morning handover. But, other handovers such as the afternoon handover and the evening handover have been a lot more informal*

This view was shared by other interns and registrars. INT M even attempted to rationalise the lack of structure at night handover.

INT M: *when night handover is a lot quicker and to the point. And maybe people want to go home, new people are starting, want to, new regs are starting, they want to get down to DEM and start to work or, or whatever.*

Other interns provided a much more disturbing picture of evening and night handovers. It appeared that evening and night handovers often did not happen at all. Two interview excerpts are provided below. INT L and INT S both openly stated that handover in the evening and at night did not always happen. INT L for example quite openly indicated that the attendance of evening and night handovers were quite variable, and she did not normally attend these handovers.

INT L: *But it is variable in that some people do attend handover every, and then, your handover, yeah, critical patients and some people do handover all the patients and run through them all. Which I don't.*

STRUCTURE not only influenced SUPPORT but also influenced EDUCATIONAL COMPONENT. The education of interns and registrars during handover was commonly done through case discussions and feedback. The format and structure of clinical handover allowed for better discussion and feedback. When that structure was not followed, it could evolve into long conversations which impacted on the educational value of the handover session.

REG C: *In practice, um, the clinical handover tends to lose its structure and can develop into a story telling session which may or may not be helpful educationally.*

The relationship between STRUCTURE and INFORMATION TRANSFER was complex. The researcher noted in the observation sessions that the structure of clinical handover did assist in the presentation of information and information transfer. This relationship was however not causal. It was a reciprocal relationship as the process of information transfer and information requirements impacted on the structure of clinical handover. The lack of structure in handover could lead to a less efficient and effective transfer of information. An example of this relationship was illustrated by INT M who highlighted that the lack of a formal structure at night handover often meant that the information transferred was not the same.

INT M: Night handover is a lot quicker and to the point, and maybe people want to go home, new people are starting, want to, new regs are starting, they want to get down to DEM and start to work or, or whatever(Information passed on) is probably not the same

INFORMATION TRANSFER, especially the perception of the requirements of information transfer amongst clinicians had an influence on the *STRUCTURE* of clinical handover. This reciprocal relationship is explained in Section 4.3.4.5.

STRUCTURE influenced *CLINICAL HANDOVER OUTCOMES*. There were two aspects to this relationship. Firstly, *STRUCTURE* influenced *INFORMATION TRANSFER* which in turn affected patient care. *STRUCTURE* therefore had an indirect impact on *CLINICAL HANDOVER OUTCOMES*. Clinical handover also included determining which clinicians were responsible for patient care as well as taking note of mortality and ensuring that there was a good distribution of workload via the capping rule. This is further explained in *CLINICAL HANDOVER OUTCOMES*. This relationship was more evident during observation sessions and informal discussions with the participants.

4.3.4.5 Information transfer

From the observation sessions, the researcher noted that the term “information transfer” did not merely refer to a one way transfer of information. Participants wanted to obtain adequate information about a patient for use on their shift. This usually involved discussions amongst participants and was more of an exchange of information. This was illustrated by CON J1 who believed that the transfer and communication of information between teams is important and should be the main goal of handover.

CON J1: Handover basically what happened when staff wasn't in the hospital, from 5 in the evening before, to 8 in the morning. Firstly, that the actual issues of each patient are highlighted so we know what we are taking over, ah and what investigations have been done, and where they are in the pipeline so all that clinical detail is handed over.

Communication during handover was more than just the mere transfer of information. This was highlighted by an interview with CON N who indicated that it was an information exchange session in order to ensure accuracy of the information presented. The nature of information transfer differed depending on the nature and structure of handover. Face-to-face communication during handover was very important as it provided the participants with an opportunity to clarify any doubts they might have had with regards to the handover information.

INFORMATION TRANSFER moderately influenced *STRUCTURE*. Observation sessions revealed that the process of information transfer varied at different handover times and there were different structures at different handovers. Evening and night handovers only involved the temporary transfer of patient care. In the evening, handover was conducted from multiple teams to one team and the information transfer was not only ephemeral but was only a prediction of what might happen. In this instance, an unstructured informal handover appeared sufficient as completion of other clinical tasks take priority. INT L demonstrated how *INFORMATION TRANSFER* influenced *STRUCTURE*.

INT L: *I don't think that it is necessarily a bad thing for the intern handovers in the afternoon, because when there is a problem, then you will be look after some of the more trivial complaints, compared to some of the more serious problems. I don't think, there actually need to, you know, yeah come up and have a formal time for it.*

This view was however not shared by other participants. Registrars and consultants emphasised the need to have a more structured handover in order to ensure the transfer of information. They viewed all forms of information transfer, including transfer of ephemeral information as important for patient care and having a direct impact on the *CLINICAL HANDOVER OUTCOMES*. REG R believed that a good formal handover to ensure information transfer was important. This was because *INFORMATION TRANSFER* influenced *CLINICAL HANDOVER OUTCOMES* and ultimately impacted on patient care.

REG R: *I think like when I used to do nights I really appreciated when I know what was going on in the wards, so they could call me they didn't have to spend so much time explaining to me what's happening what's this all about, it's just easier to sit down and talk about things before everyone goes off.*

CON J also illustrated the relationship between *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES* by highlighting the importance of communication in medicine and clinical handover and the important role of information transfer in ensuring good patient care.

CON J: *the transfer information is a most basic thing in medicine. Communication is the most important thing that we do. To ensure that we communicate to the other person exactly what we mean. Now, that is in general term the biggest single problem in medicine, most of the errors occur because of communication collapse. So, I mean anything that facilitates clinical communication is of benefit, and that's the purpose of this handover as I understand it.*

INFORMATION TRANSFER was influenced by *ATTENDANCE* (see Section 4.3.4.1) and *STRUCTURE* (see Section 4.3.4.4).

4.3.4.6 Clinical handover outcomes

As indicated above, *ATTENDANCE* directly and indirectly influenced *CLINICAL HANDOVER OUTCOMES*. *ATTENDANCE* had an indirect relationship by impacting on *INFORMATION TRANSFER* and therefore impacting on *CLINICAL HANDOVER OUTCOMES*. CON J in his interview highlighted the importance of communication in medicine and clinical handover and the important role of information transfer in ensuring good patient care.

This was also supported by CON N but CON N went further to emphasise the need for clinicians to attend handover in person to achieve the goal of good patient care. It appeared that face-to-face communication was important in ensuring the accuracy of handover.

CON N: *Rather than turning up on the ward and somebody you know your own registrar didn't see them ah it's all in the notes you're trying to make sense of what somebody's written down to have it immediately from the patient ah from the doctor whose done the work is hugely valuable just as a communication exercise and getting a real feel for that patient before you see them so you actually speeds the process up enormously. It adds to efficiency, it's educational um I think it has great potential safety value you know it cements the whole process*

While clinicians focused on the main goal of patient care and good information transfer in their interviews, observation sessions revealed that the outcomes of handover also included the

distribution of workload as well as information regarding the mortality of a patient as supported by an excerpt from the clinical handover guideline (see Figure 21) distributed to all clinicians.

Capping rules

- “Capping” is to be implemented, if units B, C, PU or E reach inpatient numbers of > 25. This number is 30 for medical unit F.
- Distribution of excess patients will commence with the unit with the fewest numbers of inpatients and the furthest away from admission day, which may include the unit of the day where that unit has less than 10 current inpatients.
- One patient will be handed to each unit. Units will only stop receiving patients, when their number reach 25 (30 for Med F) or on-take unit reach 10. All excess patients are distributed in this manner.
- On most occasions, the patients to be distributed under the capping system are those admitted by the night medical registrar. The patient admitted last, will be the first to be “capped” to the other units. On-take unit cannot choose which patient to be “capped” off to other units.
- Handover of patients is completed during this session only. Juggling of patients between units is not acceptable. All concerns regarding hand-backs and capping are to be discussion at the end of the formal morning handover session as a group.
- Common sense must prevail with the handover of patients and the implementation of the “capping” rule, with acute and non-acute patients on a unit and other factors taken into consideration.
- Units without a registrar should never receive any “capped” patients.
- The leader of clinical handover is the final arbiter in all decisions related to assignment of patients to units.

Figure 21: Capping Rules

An example of the relationship between *STRUCTURE* and *CLINICAL HANDOVER OUTCOMES* was demonstrated by REG R below. *CLINICAL HANDOVER OUTCOMES* were important in ensuring good patient care through a good distribution of workload.

REG R: *I don't know what happened, I can remember at least one instance when the reg was new and the consultant just kept on receiving and they went over, they went over 25 and I don't know why and we were looking at each other, and nobody was saying anything and XXX (the clinical handover project registrar) wasn't around. And then latter on I think during the week I speak to this particular reg and I say why didn't you say anything – it's your responsibility to cap – we're there to help you but you have to say something cause if you don't we don't know what's on your list.*

CLINICAL HANDOVER OUTCOMES was influenced by *ATTENDANCE* (see Section 4.3.4.1), *STRUCTURE* (see Section 4.3.4.4) and *INFORMATION TRANSFER* (see Section 4.3.4.5).

4.3.4.7 Preliminary findings from core category Clinical handover experiences

Table 9 provides a summary of the unilateral relationships between axial codes in core category CLINICAL HANDOVER EXPERIENCES.

The axial code	Influenced the axial code	Phase One
Attendance	Support	Strong
	Educational component	Strong
	Structure	Strong
	Information transfer	Moderate
	Clinical handover outcomes	Moderate
Support	Educational component	-
	Structure	-
	Information transfer	-
	Clinical handover outcomes	-
	Attendance	-
Educational component	Structure	-
	Information transfer	-
	Clinical handover outcomes	-
	Attendance	-
	Support	Strong
Structure	Information transfer	Moderate
	Clinical handover outcomes	Moderate
	Attendance	-
	Support	Moderate
	Educational component	Moderate
Information transfer	Clinical handover outcomes	Strong
	Attendance	-
	Support	-
	Educational component	-
	Structure	Moderate
Clinical handover outcomes	Attendance	-
	Support	-
	Educational component	-
	Structure	-
	Information transfer	-

Table 9: Summary of relationships between axial codes in core category CLINICAL HANDOVER EXPERIENCES

The following presents the preliminary findings from the core category CLINICAL HANDOVER EXPERIENCES:

1. Attendance was one of the key considerations in determining the quality of clinical handover sessions as attendance was found to influence support, educational component, structure, outcomes and information transfer (see Section 4.3.4.1).
2. Educational component at clinical handover sessions was important as it provided support to the junior clinicians (see Section 4.3.4.3).
3. A structure for clinical handover sessions was important as it influenced information transfer, outcomes, support and the provision of the educational component (see Section 4.3.4.4).
4. Information transferred at clinical handover influenced the outcomes of clinical handover (see Section 4.3.4.5).

4.3.5 User requirements

USER REQUIREMENTS was the fifth core category identified in Phase One and refers to the users' perceptions of their information needs in order to improve clinical handover.

There are five axial codes in this core category.

- *DOCUMENTATION* refers to the availability of archived information on clinical handover.
- *ACCESS* refers to the users being able to view, edit and update available clinical handover information.
- *INFORMATION* refers specifically to patient details used during clinical handover.
- *PRIORITISATION* refers to the ability for users to be alerted to important tasks through the clinical handover process.
- *TOOLS* refers to artefacts which assist in the process of clinical handover.

Figure 22 provides an illustration of the relationship between axial codes in the core category USER REQUIREMENTS.

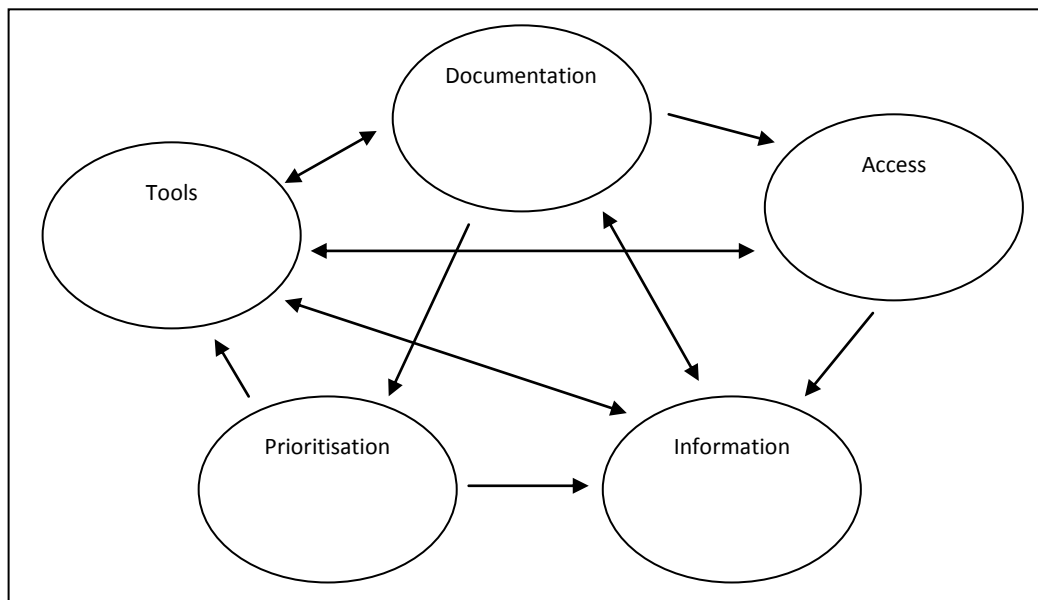


Figure 22: Relationships between axial codes in the core category USER REQUIREMENTS

DOCUMENTATION strongly influenced *ACCESS*, *INFORMATION* and moderately influenced *PRIORITISATION* and *TOOLS*.

ACCESS moderately influenced *INFORMATION* and strongly influenced *TOOLS*.

INFORMATION moderately influenced *TOOLS* and strongly influenced *DOCUMENTATION*.

PRIORITISATION weakly influenced *TOOLS* and strongly influenced *INFORMATION*.

TOOLS moderately influenced *DOCUMENTATION* and strongly influenced *ACCESS* and *INFORMATION*.

4.3.5.1 Documentation

Archiving of clinical handover information was rarely done and was highly variable amongst participants. Clinical handover information was often recorded on a piece of paper but this piece of paper was not archived. Participants believed that a formal handover sheet with good documentation of patient information and tasks requiring completion would help improve clinical handover. *DOCUMENTATION* is therefore directly related with *INFORMATION*. INT V illustrated this by indicating that it would be good to have proper documentation and also an indication of passing of an action from one clinician to another.

INT V: another thing that I think will be good, is a formal handover sheet, especially for weekends, what tends to happen is just write on a scrap of paper, with patient's name and sort of the jobs and then you know the Saturday person crossed some of that off, and then they handed over that to the next person, and then sort of going "so sort of passing" yeah

DOCUMENTATION is an issue deemed important by all participants. Many participants voiced the lack of documentation in the current clinical handover process as a problem and indicated that there should be better documentation in place to improve clinical handover. Participants believed that documentation needed to be formal, archived and easily retrievable.

DOCUMENTATION strongly influenced *ACCESS*. Proper documentation of handover information would facilitate access to clinical handover notes and participants were likely to require access to clinical handover documentation on a continual basis for the duration of the patient's stay in hospital. During the observation sessions, it was clearly seen that when the incoming team was handed over well documented handover notes, they looked through the notes thoroughly after the handover sessions to identify tasks that had to be completed and patients that had to be reviewed. On the other hand, if the handover was documented briefly on scrap pieces of paper, the incoming team would leave these notes aside rather than look through that information.

There was a reciprocal relationship between *DOCUMENTATION* and *INFORMATION*. *DOCUMENTATION* strongly influenced *INFORMATION* as clinical handover information needs to be documented in such a way that is easily read by participants. INT L indicated that handover sheets (see Appendix 3) were a good way to document information required about a patient.

INT L: Like I think the handover sheets that X's team gave for the long weekend were really good, because if you were really concerned about the patient, or you called to see them, you could just like have a look and you know exactly the plan, you know or the background of the patients. With the other patients from other team, the patients that you knew were going to be a problem, there were some handover notes to be written, although it is not as formal as, but this wasn't as clear, or easy to look at and know these need to be done

INFORMATION influenced *DOCUMENTATION*. The current paper-based clinical handover system created a problem of having information transferred through a system which was not adequately updated. This gave rise to the problem of tasks and actions not being clearly presented to the participants at a specific time. INT S had indicated that while there was some form of documentation of clinical handover information, retrieval of clinical handover information in that form could be difficult during the weekends.

INT S: So far, my experience has been that you get the sheet that has been passed on from the Friday evening intern, you find a crumpled sheet on Sunday, and you go, Oh, I think that is done, I think that's done, and you go through that, that can be with errors.

While participants acknowledged the need to have documentation of clinical handover information, they thought that informal documentation was better than no documentation at all.

DOCUMENTATION moderately influenced *PRIORITISATION* as without clear documentation of clinical handover information, it was hard to prioritise which tasks were urgent at that point in time.

INT S: Yeah, it is not clear, I guess, what is important now, two days later, many of the things will be not important anymore, especially the jobs that the intern has usually, you know, so, my experience otherwise, it is good to actually have it on paper, I would rather have that rather than have nothing.

DOCUMENTATION had a reciprocal relationship with *TOOLS*. The emphasis and strong need of documentation to support clinical handover affected the *TOOLS* which were being used for clinical handover. These *TOOLS* included pen and paper, patient stickers and MS Word documents. *TOOLS* influenced *DOCUMENTATION* in that the use of some tools such as an MS Word document facilitated good documentation whereas others like scribbling information on a scrap piece of paper did not.

4.3.5.2 Access

During observation sessions and through informal discussions with participants in Phase One, the researcher found that one of the major issues raised with regards to *USER REQUIREMENTS* was the ability to access, edit and update clinical handover information. *ACCESS* was extremely important for participants and they needed to be able to access clinical handover information simultaneously from different locations. They wanted a system that allowed them to enter and update information throughout the patient's stay at the hospital.

Problems associated with the current system were highlighted during the observation sessions and echoed by the participants. *INT L* best demonstrated this by relating her experience of working within the current system. As there was only one physical copy of handover information available, participants often did not have the time till the end of their shift to locate that physical copy of handover information. Furthermore, as there were multiple clinicians looking after the same patient each day, *INT L* was unclear as to whether the tasks have been performed and if the information presented was updated and accurate. This interview excerpt also demonstrates that *ACCESS* strongly influenced *INFORMATION*.

INT L: Umm... Yeah, I know I got the to end of that day, there were some bloods that, that I went through it you know, you know, when I sat down at handover, you know, Oh, I didn't actually check those bloods, I was meant to. I think I have seen the patient for some other reasons or something, you know, but, I haven't actually put through to see the patient, whether I need to check their blood that day. Or, I don't know OK, I don't know, I think, Yeah, perhaps I didn't handed over, like to check those bloods or, yeah, but the boxes are still there, it has not been crossed out, the next person might, I don't know, they might check yesterday, so check Saturday, it is kind of...

ACCESS was articulated by many participants in their interviews. *INT S* highlighted that the ability to access clinical handover information was important. He also went further to say that a database with easy access would be good for clinical handover improvement. This information

would need to be accessible by participants at all times, simultaneously and at different locations. The paper based documentation could also be photocopied for different users. As such, *ACCESS* moderately influenced *TOOLS*.

INT S: it will be good to, I guess umm..be able to access it, I mean to have a typed one, or be able to access it, sort of I guess a database of the handover material. Like for example, this patient this problem, for example, the emergency medicine team in the Royal, their computer system is really good, so you always have the patient's last admission or the letter or something like that, but I mean, if you there were something like that so that for a patient, for a particular patient, there is some note of what they want, what the team wants. I think that will be, probably the best way to go.

While it appears that some participants have thought about utilising electronic tools as a solution to *ACCESS*, observation and interview data suggested that participants were unsure about the role of electronic tools in clinical handover. INT C indicated that while the use of electronic tools was desirable, she was also resigned to the fact that it was a very remote possibility. This sentiment was shared by many participants through informal discussions that while they could see the benefits of electronic tools overcoming access problems in clinical handover, they did not see that happening in the near future.

INT C: it will be exciting when there will ever be an electronic discharge summary that you could actually almost sort of write that as you are going and update that as you are going, and almost like add that information, like a progress thing, and then it ends up being be the discharge summary, so that the information that you have been doing all along wouldn't have been wasted, a document at the end of it, I think it will be the ideal kind of thing but if it ever happened.

ACCESS was influenced by *DOCUMENTATION* (see Section 4.3.5.1) and *TOOLS* (see Section 4.3.5.5).

4.3.5.3 Information

While information was viewed by participants as important for clinical handover, they had difficulties in articulating exactly what information was required. Participants expressed different views regarding what information they require during handover. Many indicated that they would like to have any relevant information pertaining to the care of the patient but it appeared that the information required differed for each participant and for each patient. CON J illustrated this by explaining that the information required was whatever information that was needed to manage the care of the patient and that apart from a proper history, there was really no answer as to what information was required to be transferred at handover.

CON J: All that's relevant, there is no answer to that, only the proper history, if they have taken a proper history, all the details should be there. Umm..that's sort of given. That a proper history gives you all the information. If it doesn't, it is a bad history.

CON H echoed this view by saying that the information required was not purely about the diagnosis of the patient but more about gathering the information and presenting the information in such a way that the current issues were voiced and understood. He elaborated by explaining that the relevance of information for clinical handover was information that affected clinical management. In REG R's opinion, the most important information really related to the primary complaint of the current admission.

CON H: *I mean um it's not so much quite what the diagnosis is because the sort of people we have usually have a set of diagnoses. It's what are the specific issues now that's bringing the patient in it's usually a set of things (ok). Um, and what are what are the key investigations that have been done. Um so that's the central bit. But then I also want to make sure that the junior staff working of the night um ah doing the job properly have the sort of information that I want and understand the information so there'll frequently be discussions about well what do you think that means and ah how might what's the next thing you might do or you know um that sort of questions*

Although many participants share the same views as CON J and CON H, some went on further to illustrate more specifically what they might require.

REG R: *I guess, I only require what's pertinent – what affects management, um whatever um is relevant to the chief complaint and why he came in, cause the other details you can find out by yourself but I think the more important ones everything that pertains to the chief complaint and why this patient came in.*

Participants provided examples in their interviews to illustrate their information requirements during clinical handover. As the researcher was not a clinician, this data was presented to the clinical handover project registrar for guidance regarding the clinical importance of these information. After discussions with the clinical handover project registrar, it became apparent to the researcher that the amount of information and the level of detail was only a part of the information requirement by the participants

INFORMATION strongly influenced *DOCUMENTATION*. INT E demonstrated this point by indicating that while clinicians required a lot of information, it would be useful to classify this information into different sections to enhance readability and understanding.

INT E: *it is a patient who might have a medical condition during that time which requires management rather than just awaiting placement, then during that period, it should actually detail, you know, co-morbidities, issues that may occur, for example, pain management issues or GI bleed or other important things to remember, for example, not for code blue, so, it is sort of couple of different boxes, having some of the main items, which you need to know, and always in the same section, it will be handy to know.*

It appeared that information requirements could be broadly classified into three sections from the above quote. The first section should address what had happened to the patient so far (co-morbidities), the second should address what had happened to the patient which had led to the patient requiring a handover and the third section should address what might happen to the patient and the actions required.

INFORMATION also moderately influenced *TOOLS*. INT V indicated that a formal handover sheet should be used for weekend handovers which presents the information required for actions to be taken for the patient.

INT V: *another thing that I think will be good, is a formal handover sheet, especially for weekends...yeah, if you have a proper piece of paper, which actually has clinical or whatever problems, the patient's summary, and then you know, job and then action required*

INFORMATION was influenced by *DOCUMENTATION* (see Section 4.3.5.1), *ACCESS* (see Section 4.3.5.2), *PRIORITISATION* (See Section 4.3.5.3) and *TOOLS* (see Section 4.3.5.4).

4.3.5.4 Prioritisation

During a clinical handover session, participants who were the recipients would normally receive a large amount of handover information. Participants have indicated that a prioritisation process would be advantageous in patient care. This prioritisation process should indicate how urgently a patient needs to be seen. As expressed by INT E below, the clinical handover process would need to be able to identify sick patients who were likely to require assistance during the shift. This prioritisation process allowed for participants to have in their mind what to expect in their shift.

INT E: I guess identify the sick patients in the hospital and they are likely to need help in the next shift, so that people who are not familiar with this patient, either because they have come in recently or because they have just become unwell; so that they can be familiar with them, so that when you call to them, you basically have some idea of what they are like; what is going on. That will be the most crucial thing I think.

A similar opinion was expressed by INT M below. The prioritisation process however was explained by INT M as being highly dependent on the individual clinician. It was the clinical experience of the clinicians which helped them identify “sick” patients rather than guidelines. INT M expressed that there needed to be some form of information provided so that the receiving team understood the priorities as well as the actions required for the patient.

INT M: You certainly handover patients that you are concerned about, simple to give the next person on a heads up about you maybe called to this patient because they are very sick and chances are at same stage through the night, you are going to be called, and just give them a very brief overview.

The lack of an appropriate way of identifying a sick patient was highlighted by REG R. REG R indicated that inexperienced staff tended to handover a lot of information but as they gained more experience, they tended to focus on the more important patients and prioritised that information so that the receiving team could plan for their shift.

REG R: Yes we're running on the assumption that they know what importance is and if they don't they have a tendency to run things you know everything. But we're fine with a short thing, as long as it's complete and everything is relevant to the chief complaint. You do notice that when the night staff does a night shift when they are new to the night shift they usually get, like I think I speak for myself I usually have to get run the whole thing, you know like everything in the admission, but once you are used you know you just highlight the important stuff

The above excerpts illustrate the strong relationship between *PRIORITISATION* and *INFORMATION*. The information requirements at handover were significantly affected by the priority of patient care. Sick patients required a more detailed handover and needed to be handed over first. *PRIORITISATION* also influenced *TOOLS* which is explored in Section 4.3.5.5.

4.3.5.5 Tools

A variety of tools had been brought up by the participants, ranging from a simple piece of paper that allowed for patient identification stickers to be attached to integrated electronic tools.

An important point to highlight is that clinicians were often unsure about what tools would assist them in the process of clinical handover. They tended to mention simple tools but upon further questioning, would bring up more complex and technologically driven tools. The best example to

demonstrate this is through INT C who initially indicated that it would be beneficial to have something to attach the patient identification stickers to.

INT C: *That's right, that will be, you know, that will be really good when you have the sticker. No, I mean I think that it will be worth at least trialing you know, definitely.*

INT C also went on to indicate that it would be good to have a formal handover sheet as that not only ensured that other participants took it seriously but also provided proper documentation and addressed the information requirements of clinical handover.

INT C: *It might be psychological quite a good thing to, in fact if there is something like a handover sheet, that you can give someone, and just not a scrap a bit of a paper, make them think about it a bit more.*

When the researcher probed further, INT C indicated that having an electronic tool might be helpful. The idea of an integrated system which allowed for continuous input and update of data seemed like a good idea but INT C also revealed her lack of confidence that such a system would be developed and implemented any time soon.

INT C: *I think it would, I mean, it will be exciting when there will ever be an electronic discharge summary that you could actually almost sort of write that as you are going and update that as you are going*

This view is echoed by INT S who suggested that a database might be appropriate. INT S also indicated that a typed handover would be good and while he did not directly mention electronic tools, there was an implication that a tool which allowed for good documentation, access and information transfer was required.

INT S: *I think for the big weekend handovers, and if you can call it a handovers, At that stage, it will be good to, I guess umm..be able to access it, I mean to have a typed one, or be able to access it, sort of I guess a database of the handover material.*

The idea of a formal handover sheet to allow for access and information was voiced by many participants. INT V best demonstrates this by illustrating the relationship between *INFORMATION*, *ACCESS*, *DOCUMENTATION* and *PRIORITISATION*. Firstly, the tool, in this case was a handover sheet that was useful in addressing the information requirements. Secondly, the handover sheet allowed for good access to information and thirdly, a tick box on the handover sheet facilitated prioritisation and documentation.

INT V: *another thing that I think will be good, is a formal handover sheet, especially for weekends, what tends to happen is just write on a scrap of paper, with patient's name and sort of the jobs and then you know the Saturday person crossed some of that off, and then they handed over that to the next person, and then sort of going "so sort of passing" yeah, if you have a proper piece of paper, which actually has clinical or whatever problems, the patient's summary, and then you know, job and then action required, so that there is no confusion about checking blood, about what you have to do with the results once you have them.*

TOOLS was influenced by *DOCUMENTATION* (see Section 4.3.5.1), *ACCESS* (see Section 4.3.5.2), *INFORMATION* (see Section 4.3.5.3) and *PRIORITISATION* (see Section 4.3.5.4).

As demonstrated above, the tools required in improving clinical handover would have to fulfil all other requirements presented in this core category. While participants were uncertain as to

which tool was best, they articulated their desires to utilise tools in improving clinical handover. The tools presented above range from a simple piece of paper to more complex electronic tools. The insights generated in this phase will be drawn on for Phase Two of this research.

4.3.5.6 Preliminary findings from core category USER REQUIREMENTS

Table 10 provides a summary of the unilateral relationships between the axial codes in the core category USER REQUIREMENTS.

The axial code	Influenced the axial code	Phase One
Documentation	Access	Strong
	Information	Strong
	Prioritisation	Moderate
	Tools	Moderate
Access	Information	Moderate
	Prioritisation	-
	Tools	Strong
	Documentation	-
Information	Prioritisation	-
	Tools	Moderate
	Documentation	Strong
	Access	-
Prioritisation	Tools	Weak
	Documentation	-
	Access	-
	Information	Strong
Tools	Documentation	Moderate
	Access	Strong
	Information	Strong
	Prioritisation	-

Table 10: Summary of relationships between axial codes in core category USER REQUIREMENTS

The following presents the preliminary findings from core category USER REQUIREMENTS:

1. Participants had recognized the need for better documentation of clinical handover notes in order to improve clinical handover (see Section 4.3.5.1). They had identified proper documentation (see Section 4.3.5.1), access (see Section 4.3.5.2), information (see Section 4.3.5.3), prioritisation (see Section 4.3.5.4) and tools (see Section 4.3.5.5) as requirements for clinical handover improvement.

4.4 Relationship between core categories in Phase One

This section provides a detailed description of the five core categories which emerged from the coding process described in Chapter 3. These five categories are: DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCE and USER REQUIREMENTS.

The five core categories are defined as follows:

- DEPARTMENTAL REQUIREMENTS refers to both formal and informal directions instituted by the Department of General Internal Medicine for clinical handover. There are four axial codes associated with this core category – *POLICIES AND GUIDELINES*, *CLINICIAN ROLES*, *EDUCATION AND TRAINING* and *DEPARTMENT TRADITION*.

- PARTICIPANT ATTRIBUTES refers to the characteristics of the participants who are involved in handover. There are six axial codes associated with this core category: *UNDERSTANDING, EXPECTATIONS, INDIVIDUAL PERSONALITIES, COMMUNICATION STYLES, CULTURAL BACKGROUND* and *BEHAVIOUR*.
- ENVIRONMENTAL CONSIDERATIONS refers to the environment in which clinical handover is being conducted as well as environmental factors which impact on clinical handover. There are five axial codes associated with this core category: *WORKLOAD, VENUE, DISTRACTIONS, NUMBER OF PARTICIPANTS* and *TEAM DYNAMICS*.
- CLINICAL HANDOVER EXPERIENCES refers to the participant's experiences of handover at the Department of General Internal Medicine. There are six axial codes associated with this core category: *ATTENDANCE, SUPPORT, EDUCATIONAL COMPONENT, STRUCTURE, INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*.
- USER REQUIREMENTS refers to the users' perceptions of their information needs in order to improve clinical handover. There are five axial codes associated with this core category: *DOCUMENTATION, ACCESS, INFORMATION, PRIORITISATION* and *TOOLS*.

The relationships between these five categories are illustrated in Figure 23 below.

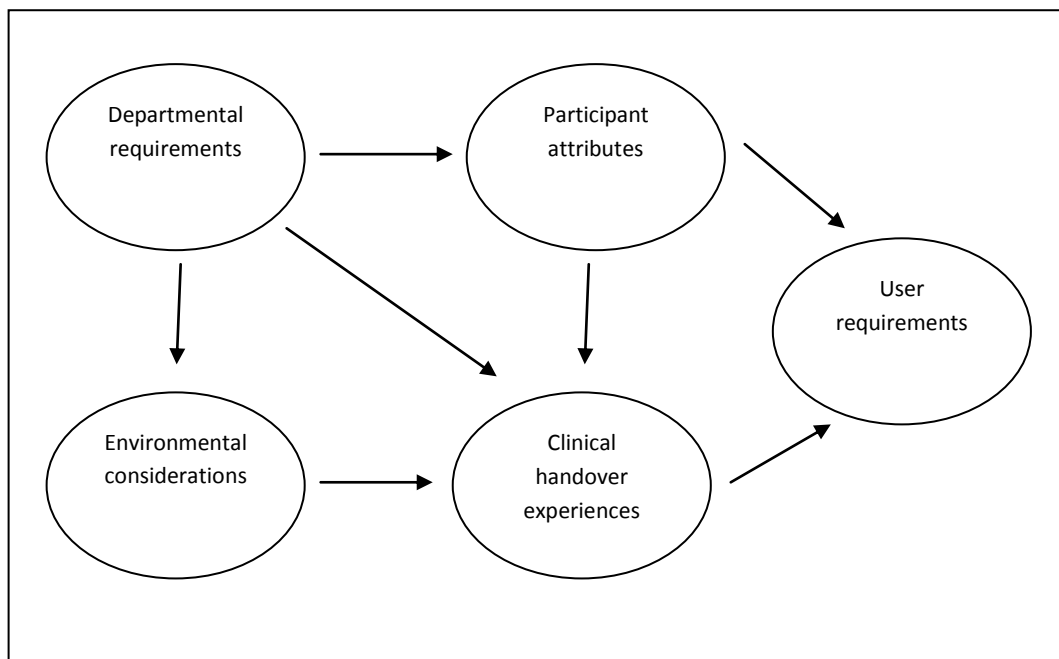


Figure 23: Relationship between core categories

DEPARTMENTAL REQUIREMENTS affected PARTICIPANT ATTRIBUTES. This was primarily due to *POLICIES AND GUIDELINES, DEPARTMENT TRADITION* and *EDUCATION AND TRAINING* which influenced *UNDERSTANDING, EXPECTATIONS, COMMUNICATION STYLES* and to some extent, *BEHAVIOURS* at handover. DEPARTMENT REQUIREMENTS also affected ENVIRONMENT CONSIDERATIONS. DEPARTMENT REQUIREMENTS determined *WORKLOAD, VENUE, DISTRACTIONS* and *NUMBER OF PARTICIPANTS* and these influenced *TEAM DYNAMICS*. DEPARTMENT REQUIREMENTS also shaped the participants' CLINICAL HANDOVER EXPERIENCES. DEPARTMENT REQUIREMENTS provided the basis for *ATTENDANCE, SUPPORT, EDUCATIONAL COMPONENT, STRUCTURE* and *INFORMATION TRANSFER* at handover. These affected the accuracy of handover.

PARTICIPANT ATTRIBUTES was affected by DEPARTMENT REQUIREMENTS. PARTICIPANT ATTRIBUTES played a significant role in CLINICAL HANDOVER EXPERIENCES. It not only affected an individual's handover experience but also affected many other participant's experience and also changed the behaviours of others during handover. PARTICIPANT ATTRIBUTES influenced USER REQUIREMENTS as the requirements identified for clinical handover improvement were based on PARTICIPANT ATTRIBUTES.

ENVIRONMENTAL CONSIDERATIONS was related to DEPARTMENTAL REQUIREMENTS and CLINICAL HANDOVER EXPERIENCES. ENVIRONMENTAL CONSIDERATIONS had a direct impact on the CLINICAL HANDOVER EXPERIENCES as it impacted on how handover was conducted and participants' experiences of handover.

CLINICAL HANDOVER EXPERIENCES was affected by all the other core categories. While DEPARTMENTAL REQUIREMENTS and ENVIRONMENTAL CONSIDERATIONS did impact on CLINICAL HANDOVER EXPERIENCES, the strongest relationship lied between PARTICIPANT ATTRIBUTES and CLINICAL HANDOVER EXPERIENCES. PARTICIPANT ATTRIBUTES impacted on not only the CLINICAL HANDOVER EXPERIENCES of each individual but the whole team and handover sessions. CLINICAL HANDOVER EXPERIENCES influenced USER REQUIREMENTS. Participants identified their requirements for clinical handover improvement through the experiences that they encountered.

4.5 Chapter reflections

This chapter has provided an analysis of the data collected in Phase One drawing on the principles of grounded theory. Five core categories have emerged from this analysis – DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and USER REQUIREMENTS. The relationships between the axial codes within each core category and the relationships between core categories were analysed. The preliminary findings which emerged from this analysis indicated that clinical handover was a complex and dynamic process which served various functions. Various factors and the interrelationships between these factors influenced clinical handover. Department tradition had a big influence on how clinical handover was being conducted.

The most significant finding in Phase One was that clinicians had different views of clinical handover depending on their levels of seniority. A consultant's and registrar's view of clinical handover differed markedly from that of an intern. As such, clinical handover improvement initiatives need to consider the different groups of users within the department. Clinical practice also depended largely on teamwork and in order to truly understand a users' perspective in the delivery of clinical care in a hierarchical environment further insights can be obtained by grouping participants according to their seniority levels to in order to understand how they functioned when they worked together.

At the end of Phase One, the Department of General Internal Medicine arrived at a decision to trial the use of an electronic tool as part of their ongoing clinical handover improvement efforts and the researcher was invited to be part of that process. The insights obtained from Phase One suggested that a second round of data collection using focus groups to understand the status of clinical handover before conducting design workshops to assist in the development of the electronic tool would be useful. Focus groups were deemed to be useful as the most significant

finding in Phase One was that clinicians have a different view of clinical handover depending on their levels of seniority. A consultant's and registrar's view of clinical handover differed markedly from that of an intern. As such, clinical handover improvement initiatives needed to consider the different groups of users within the department. Clinical practice also depended largely on teamwork and in order to truly understand a users' perspective in the delivery of clinical care in a hierarchical environment further insights can be obtained by grouping participants according to their seniority levels to in order to understand how they function when they work together. In addition, the data collected in Phase One towards the end of the year provided insights from an experienced group of participants as they had almost reached the end of their rotation. Data collected in Phase Two (see Chapter 5) was from a relatively inexperienced group of participants as they were at the start of their rotations. As a result, it was interesting to obtain a perspective of clinical handover and clinical handover improvement from a group of less experienced participants.

The next chapter provides a detailed analysis of the data obtained from the focus groups in Phase Two of this research with a new cohort of registrars and interns. The data collected in Phase Two provided further insight to the preliminary findings in Phase One as to the understanding of the status of clinical handover and clinical handover improvement in the Department of General Internal Medicine, and provided a basis for discussion about the user requirements in the design workshops for the development of the electronic tool.

Chapter 5 Data analysis Phase Two

5.1 Introduction

This chapter details the analysis of the data obtained from two focus groups conducted in Phase Two.

- Section 5.2 provides a detailed description of the axial codes associated with each core category and the relationships between the axial codes within each core category. The core categories of DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and USER REQUIREMENTS are discussed with references made to relationships within the axial codes in each of the core categories.
- Section 5.3 provides a description of how the five core categories – DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and USER REQUIREMENTS relate to one another.
- Section 5.4 provides a summary reflection of the chapter.

5.2 Core categories

This section provides a detailed description of the core categories and their associated axial codes which emerged from the coding process described in Section 3.6. It also highlights the relationships between the axial codes within each core category. The core categories identified are as follows:

- Departmental requirements
- Participant attributes
- Environmental considerations
- Clinical handover experiences
- User requirements

The following provides a detailed description of the core categories in Phase Two.

5.2.1 Departmental requirements

DEPARTMENTAL REQUIREMENTS was the first core category identified in PhaseTwo and refers to directions instituted by the Department of General Internal Medicine for clinical handover.

There are four axial codes associated with this core category.

- *POLICIES AND GUIDELINES* refers to a formal direction provided by the Department of General Internal Medicine on the conduct of handover.
- *CLINICIAN ROLES* refers to the functions that each intern, registrar or consultant serves in patient care as well as during clinical handover.
- *EDUCATION AND TRAINING* refers to the teaching of handover to participants.

- *DEPARTMENT TRADITION* refers to the way things have always been done.

Figure 24 provides an illustration of the relationship between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

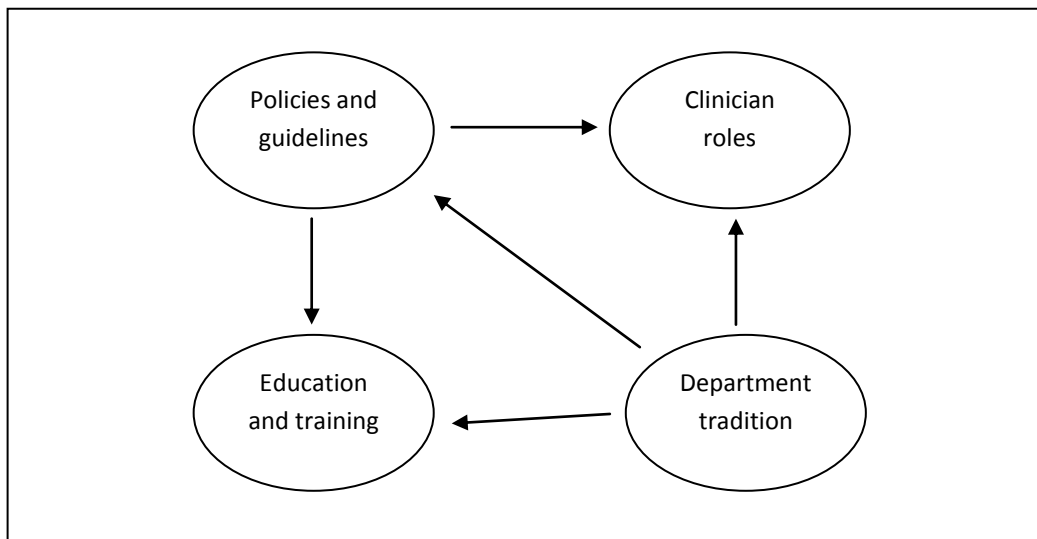


Figure 24: Relationship between axial codes in the core category DEPARTMENTAL REQUIREMENTS

POLICIES AND GUIDELINES moderately influenced *CLINICIAN ROLES* and *EDUCATION AND TRAINING*.

DEPARTMENT TRADITION strongly influenced *POLICIES AND GUIDELINES*, *CLINICIAN ROLES* and *EDUCATION AND TRAINING*.

5.2.1.1 Policies and guidelines

There had been no alterations to the existing clinical handover guidelines and the clinical handover manual presented in Phase One. Some participants remained unaware of the guidelines and how clinical handover should be conducted.

INT FP stated that if its a Monday morning, she will just hand the paper back to the home team.

REG MW indicated that handover really should follow the guidelines, especially for handbacks but unfortunately most people are not familiar with the guidelines.

POLICIES AND GUIDELINES moderately influenced *CLINICIAN ROLES* at clinical handover. Registrars were quite clear about their role in providing a written handover as indicated by the guidelines but were less clear about their role in receiving handover. Interns on the other hand appeared to see their role as receiving handover rather than giving handover.

REGS MW and *BA* were quite clear on what to present at clinical handover in accordance with the guidelines. This was demonstrated further at the Design workshops when they were asked to handover the Case scenarios. *REG SJ* on the other hand only wanted a verbal presentation of the case.

Interns EM and *AT* on the other hand, wanted a written handover to be provided to them and they did not see themselves presenting during handover time.

POLICIES AND GUIDELINES moderately influenced *EDUCATION AND TRAINING*. The policies and guidelines served as an educational tool and those registrars and interns that were aware of the policies and guidelines indicated that they learnt from them.

Intern SH referred to the information presentation in the guideline when discussing how she would present the information to the next intern.

REG SS indicated that the guidelines helped with defining clinical handover and teaching him what to do at handover time.

POLICIES AND GUIDELINES, however, had no influence on *DEPARTMENT TRADITION*. While participants recognised that they were meant to participate in evening handover as stated in the clinical handover manual, it was *DEPARTMENT TRADITION* that it was usually not done due to time constraints and participants indicated that it was unlikely to change in the near future.

When discussing evening handover, all interns and registrars acknowledged that while they were meant to do it (and some pointed to the policies and guidelines in place), they usually did not due to time constraints and it was unlikely that they were going to be able to do it in the near future.

POLICIES AND GUIDELINES was influenced by *DEPARTMENT TRADITION* (see Section 5.2.1.4).

5.2.1.2 Education and training

Participants indicated that they did not receive adequate education and training in clinical handover from either the University or the Department of General Internal Medicine.

Intern EM mentioned that there were no education and training regarding clinical handover and she was keen to learn about it if someone was willing to teach.

EDUCATION AND TRAINING was strongly influenced by *DEPARTMENT TRADITION*. While the Department was actively trying to incorporate some teaching into clinical handover sessions, it was clear that that was not the case in many clinical handover sessions as demonstrated by *INT SH*.

INT SH: People are not very interested in teaching us, they just yell at us.

EDUCATION AND TRAINING was influenced by *POLICIES AND GUIDELINES* (see Section 5.2.1.1) and *DEPARTMENT TRADITION* (see Section 5.2.1.4).

5.2.1.3 Clinician roles

Different groups of participants had different roles at clinical handover. Registrars played a significant role in clinical handover whereas interns played more of a background role in clinical handover.

CLINICIAN ROLES was influenced by *DEPARTMENT TRADITION* (see Section 5.2.1.4).

5.2.1.4 Department tradition

DEPARTMENT TRADITION strongly influenced *POLICIES AND GUIDELINES*. Interns were not traditionally heavily involved in clinical handover and were usually not involved in the discussions regarding the management of patient care. The guidelines developed in 2005 only focused on what registrars should do and not what interns should do at clinical handover. While the participants understood that all handovers were important, the department had always placed a stronger

focus on morning handover and therefore the guidelines prepared mainly focussed on morning handover.

DEPARTMENT TRADITION also strongly influenced *EDUCATION AND TRAINING*. While there was no formal teaching in place, there was some on the job teaching provided by the registrars and consultants at handover time but this was on an ad-hoc basis. The teaching on handover that was provided was based on personal experiences and how handover was usually conducted in the Department.

DEPARTMENT TRADITION strongly influenced *CLINICIAN ROLES*. INT SP indicated that while the guidelines had stated what an interns' role was at handover, that was less important than doing what others said should be done.

5.2.1.5 Preliminary findings from core category DEPARTMENTAL REQUIREMENTS

Table 11 provides a summary of the unilateral relationships between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

The axial code	Influenced the axial code	Phase Two
Policies and guidelines	Clinician roles	Moderate
	Education and training	Moderate
	Department tradition	-
Clinician roles	Education and training	-
	Department tradition	-
	Policies and guidelines	-
Education and training	Department tradition	-
	Policies and guidelines	-
	Clinicians roles	-
Department tradition	Policies and guidelines	Strong
	Clinician roles	Strong
	Education and training	Strong

Table 11: Summary of relationships between axial codes in core category DEPARTMENTAL REQUIREMENTS

The following presents the findings from core category DEPARTMENTAL REQUIREMENTS:

- Policies and guidelines can help in clinical handover improvement by clarifying the roles of clinicians during clinical handover and providing guidance on how to handover patients (see Section 5.2.1.1).
- Participants did not recognise the guidance provided in the clinical handover manual as adequate education and training in clinical handover (see Section 5.2.1.2).
- Clinicians had different roles in patient care depending on their level of seniority (see Section 5.2.1.3).
- Department tradition heavily dictated the way clinical handover was conducted in the Department (Section 5.2.1.4) as it strongly influenced the clinical handover guidelines and the clinical handover manual developed, the roles of clinicians within the department and the way informal way education and training was being conducted in the department.

5.2.2 Participant attributes

PARTICIPANT ATTRIBUTES was the second core category identified in Phase Two and refers to the characteristics of the participants working in the Department of General Internal Medicine who were involved in handover. In this context, participants included interns, registrars and consultants.

There were six axial codes associated with this core category. These axial codes are defined as follows:

- *UNDERSTANDING* refers to the participant's knowledge of clinical handover. This includes their understanding of what clinical handover is and what it should constitute.
- *EXPECTATIONS* refers to the participant's perceptions of what a clinical handover session should encompass and what they should get out of it.
- *INDIVIDUAL PERSONALITIES* refers to the participant's character and qualities.
- *COMMUNICATION STYLES* refers to how a participant relays or receives clinical handover information.
- *CULTURAL BACKGROUND* refers to the participant's social, cultural and linguistic backgrounds.
- *BEHAVIOUR* refers to the participant's actions during clinical handover sessions.

Figure 25 provides an illustration of the relationships between axial codes in the core category PARTICIPANT ATTRIBUTES.

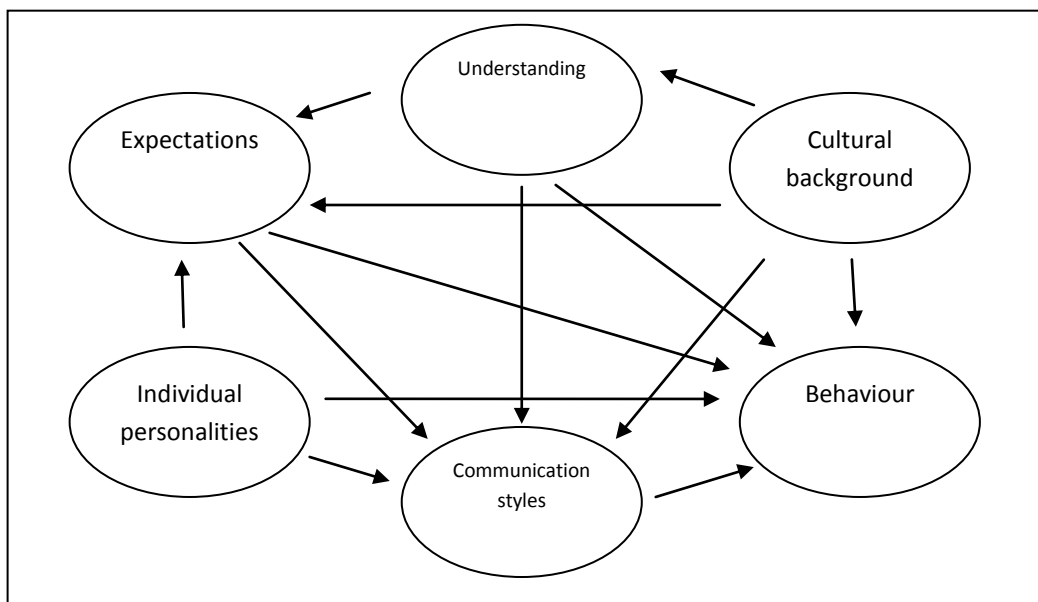


Figure 25: Relationship between axial codes in the core category PARTICIPANT ATTRIBUTES.

UNDERSTANDING strongly influenced *BEHAVIOUR*, *EXPECTATIONS* AND *COMMUNICATION STYLES*.

EXPECTATIONS strongly influenced *BEHAVIOUR*.

INDIVIDUAL PERSONALITIES strongly influenced *COMMUNICATION STYLES* and moderately influenced *EXPECTATIONS* and *BEHAVIOUR*

COMMUNICATION STYLES **STRONGLY** influenced *BEHAVIOUR*.

CULTURAL BACKGROUND strongly influenced *BEHAVIOUR*, *UNDERSTANDING*, *EXPECTATIONS* and *COMMUNICATION STYLES*.

5.2.2.1 Understanding

The focus groups revealed that while participants had a different interpretation of clinical handover, there were some commonalities in place. Registrars understood clinical handover from a more cognitive level. Their understanding of clinical handover was a process of transferring information and providing situation awareness about sick patients and the ward and implicitly, transferring responsibility and accountability of patient care.

***REG AR** indicated that clinical handover for registrars is to provide continual patient care and it was therefore important to ensure that the weekend handover included all patients with diagnosis and issues that had to be taken care of.*

Interns considered handover as the handing over of tasks which needed to be completed for patient care. The background diagnosis was less of an issue if they did not need to be reviewed.

***INT AT** stated that handover for interns mainly contained tasks which needed to be completed.*

UNDERSTANDING strongly influenced *EXPECTATIONS*. As different participants had a different understanding of clinical handover, their expectations of clinical handover were also different. Interns wanted a written task list but registrars wanted more time for discussions in order to understand the patient whom they were looking after.

***INT EM** stated that for most handovers among interns, written information was adequate and during morning handover, interns often just listened rather than participate. The registrars were the ones who need to discuss patients.*

UNDERSTANDING strongly influenced *COMMUNICATION STYLES*. Registrars needed a face-to-face handover to discuss patient details in order to convey their thoughts on the case. Many of the intern handovers however were conducted asynchronously as they were mainly about conveying which tasks needed to be completed.

***REG SJ** stated that paper based handover was less important as they (registrars) needed to know what the thought processes was in arriving at the diagnosis. Therefore, handover needed to be done face-to-face with time for discussion.*

***INT SH** stated that handover could be done in a paper format as far as the information required was transferred.*

UNDERSTANDING strongly influenced *BEHAVIOUR*. Registrars often listened to what was presented and only interrupted to clarify information whereas interns merely listened and documented what needed to be done.

REG AR stated that registrar needed to pay attention to presentation as they needed to understand the patient while for interns, this is less important as they probably just needed a list of tasks although it would be good if they could listen rather than got distracted.

UNDERSTANDING was influenced by *CULTURAL BACKGROUND* (see Section 5.2.2.4).

5.2.2.2 Expectations

Registrars and interns had different ideas of what they wanted out of clinical handover.

EXPECTATIONS strongly influenced *BEHAVIOUR*. A participants' involvement in clinical handover was influenced by the way in which they expected clinical handover to take place. Their expectations of other participants' behaviour at clinical handover was also in accordance with their own expectations of clinical handover.

INT SH indicated that she expected to be given detailed information of all the things that needed to be done for the relevant patients and therefore made it a point to pay attention and participate at handover.

INT FP indicated that he only wanted to get the list of jobs that he had to do and therefore his point of being at handover was only to obtain the list of tasks that was provided at the end of handover.

EXPECTATIONS was influenced by *UNDERSTANDING* (see SECTION 5.2.2.1), *INDIVIDUAL PERSONALITIES* (see SECTION 5.2.2.3) and *CULTURAL BACKGROUND* (see SECTION 5.2.2.4).

5.2.2.3 Individual personalities

While the basic understanding of clinical handover amongst the participants might be similar, what they expected, how they communicated and how they behaved at clinical handover sessions might be quite different due to the strong influence of each participant's personality.

INDIVIDUAL PERSONALITIES had a moderate influence on *EXPECTATIONS*. This was illustrated by REGS BA and MW. While both registrars agreed that clinical handover was important and should be conducted in a detailed manner to ensure continuity of patient care, their expectations of clinical handover were quite different.

REG AB indicated that he was quite a perfectionist and wanted everything right. He therefore expected handover to follow a clear structure.

REG MW stated that he did not really care how it was done as far as it was done as long as the information was adequate to ensure good patient care.

INDIVIDUAL PERSONALITIES had a strong influence on *COMMUNICATION STYLES*. Participants who were perfectionists had a tendency to ensure that every detail about the patient was communicated to the incoming team when they handed over. Their communication style included a detailed verbal handover accompanied with detailed handover notes. Some participants on the other hand who were less conscientious would only conduct a verbal handover expecting the incoming team to document the information as required as well as request for further information if needed. This relationship was very strong and even stronger than that of the influence of *UNDERSTANDING* on *COMMUNICATION STYLES*.

REG AB stated that he would make sure that all relevant patient information was provided to the incoming team through a detailed discussion of the patient as physically writing the information down and giving it to the incoming team.

REG MW would present important information verbally and he believed that it is up to the incoming team to document the information that they required.

INDIVIDUAL PERSONALITIES also had a moderate influence on **BEHAVIOUR**. Participants who were more conscientious usually spent more time in preparing the information for handover. Participants who were less conscientious would usually just deliver what was required subject to time constraints.

REG AB stated that he was willing and often did stay after his shift to type the relevant information into a word document although this information had already been handed over to the incoming team.

REG MW stated that even if he only received a list containing patient stickers, he would consider that as handover although he preferred to receive some information about their care

Intern MK stated that he would find it very difficult to handover many outstanding tasks to the next team they would not like that at all. He would feel guilty about handing over all the tasks, so, he might at times not hand over less important tasks.

5.2.2.4 Cultural background

CULTURAL BACKGROUND had a strong influence on **UNDERSTANDING**, **EXPECTATIONS**, **COMMUNICATION STYLES** and **BEHAVIOUR**. It was also observed that **CULTURAL BACKGROUND** also influenced **BEHAVIOUR** of participants during the focus groups and design workshops. Participants within some socio-cultural groups did not express their opinions unless they were prompted. They tended to be less verbal when it came to group sessions. When they did voice their opinions, they were sometimes dismissed by other participants in the group either by talking over them or by ignoring the point that they made.

CULTURAL BACKGROUND strongly influenced **UNDERSTANDING** and **EXPECTATIONS**. Participants of different cultural backgrounds had different ideas of how clinical service should be delivered. Some participants believed that the diagnosis should be made by one person and there was no need for a detailed discussion to take place in order to reach a diagnosis. Others however liked to engage in discussions in order to reach a consensus. As such, this influenced their understanding of whether clinical handover should be a time for discussions or just a pure transfer of patient information to the next team. This in turn influenced their expectations of what was to happen at clinical handover.

REG SJ stated that he only really wanted a list of the patient names and what was wrong with them as he did not see a lot of point in going into lengthy discussions as each clinician could form their own diagnosis about their patients. This point was shared by the group of doctors within the same cultural background.

Other registrars believed that discussion about patient is important to reach a diagnosis.

CULTURAL BACKGROUND strongly influenced **COMMUNICATION STYLES**. This was evident in the focus groups and also in the process of clinical handover.

REG SS stated that he only talked about simple factual things because he did not think that other people were interested in listening to other information.

Finally, *CULTURAL BACKGROUND* strongly influenced *BEHAVIOUR*. This was evident from observations from the focus groups and design workshops.

The discussions during the focus groups and workshops demonstrated that participants from certain socio-cultural backgrounds tended to be a “silent participant” in handover and less vocal in voicing their concerns or opinions.

5.2.2.5 Communication styles

Different participants have different ways of communicating. This was obvious during the focus groups when the participants were asked to engaged in a discussion about clinical handover and specifically describing what they would handover and how and in the design workshops when they were asked to handover case scenarios.

The relationship between *COMMUNICATION STYLES* and *BEHAVIOUR* was confirmed in Phase Two. A participants’ communication style often affected the behaviour of other participants at clinical handover.

INT SP indicated that whether she actually documented anything at handover and whether she actually paid attention at handover was to some extent related to how the cases were presented. If the outgoing team presented a succinct summary of the case and highlighted the relevant information, she was more likely to pay attention than if the outgoing team provided a very “waffly” handover in which she would “switch off”.

COMMUNICATION STYLES was influenced by *UNDERSTANDING* (see Section 5.2.2.1), *EXPECTATIONS* (see Section 5.2.2.2), *INDIVIDUAL PERSONALITIES* (see Section 5.2.2.3) and *CULTURAL BACKGROUND* (see Section 5.2.2.4).

5.2.2.6 Behaviour

A participant’s behaviour was important in ensuring that the goals of handover were achieved.

BEHAVIOUR was influenced by *UNDERSTANDING* (see Section 5.2.2.1), *EXPECTATIONS* (see Section 5.2.2.2), *INDIVIDUAL PERSONALITIES* (see Section 5.2.2.3), *CULTURAL BACKGROUND* (see Section 5.2.2.4) and *COMMUNICATION STYLES* (see Section 5.2.2.5). *UNDERSTANDING* also influenced *BEHAVIOUR* through developing *EXPECTATIONS*. This was especially important in regard to a registrar’s expectations influencing the behaviour of their interns.

5.2.2.7 Preliminary findings from core category PARTICIPANT ATTRIBUTES

Table 12 provides a summary of the unilateral relationships between axial codes in the core category PARTICIPANT ATTRIBUTES.

The axial code	Influenced the axial code	Phase Two
Understanding	Expectations	Strong
	Individual personalities	-
	Communication styles	Strong
	Cultural background	-
	Behaviour	Strong
Expectations	Individual personalities	-
	Communication styles	-
	Cultural background	-
	Behaviour	Strong
	Understanding	-
Individual personalities	Communication styles	Strong
	Cultural background	-
	Behaviour	Moderate
	Understanding	-
	Expectations	Moderate
Communication styles	Cultural background	-
	Behaviour	Strong
	Understanding	-
	Expectations	-
	Individual personalities	-
Cultural background	Behaviour	Strong
	Understanding	Strong
	Expectations	Strong
	Individual personalities	-
	Communication styles	Strong
Behaviour	Understanding	-
	Expectations	-
	Individual personalities	-
	Communication styles	-
	Cultural background	-

Table 12: Summary of relationship between axial codes in core category PARTICIPANT ATTRIBUTES

The following presents the preliminary findings from core category PARTICIPANT ATTRIBUTES:

- While participants had a different understanding of clinical handover, there were commonalities of understanding of clinical handover amongst interns as a group and registrars as a group and this influenced their expectations of clinical handover (see Section 5.2.2.1).
- Individual personalities appeared to play a big role in the quality of the handover conducted as it influenced expectations of handover and the participants' behavior at clinical handover sessions (see Section 5.2.2.3).
- Cultural background continued to play a very significant role in the quality of the handover conducted as it influenced understanding, expectations, communication styles and behavior at clinical handover. This was true not only for the participant himself but also for the other participants who were involved in the clinical handover session (see Section 5.2.2.4).

- Communication styles varied amongst participants but an individual participant's communication style influenced the behaviour of other participants at handover (see Section 5.2.2.5).
- A participant's behavior during clinical handover session determined if the goals of handover were achieved and this was influenced by the interplay between understanding and expectations of clinical handover, their personalities and cultural background (see Section 5.2.2.6).

5.2.3 Environmental considerations

ENVIRONMENTAL CONSIDERATIONS was the third core category identified in Phase Two and refers to the environment in which clinical handover is being conducted as well as environmental factors which impact on clinical handover.

There were five axial codes associated with this core category. These axial codes are defined as follows:

- *WORKLOAD* refers to the amount of work that a participant has to complete within their shift.
- *VENUE* refers to the physical location in which clinical handover is conducted
- *DISTRACTIONS* refers to anything that diverts the participant's attention during handover
- *NUMBER OF PARTICIPANTS* refers to the total number of participants present at handover
- *TEAM DYNAMICS* refers to how the interns, registrars and consultants work together as a team to provide patient care.

Figure 26 provides an illustration of the relationship between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

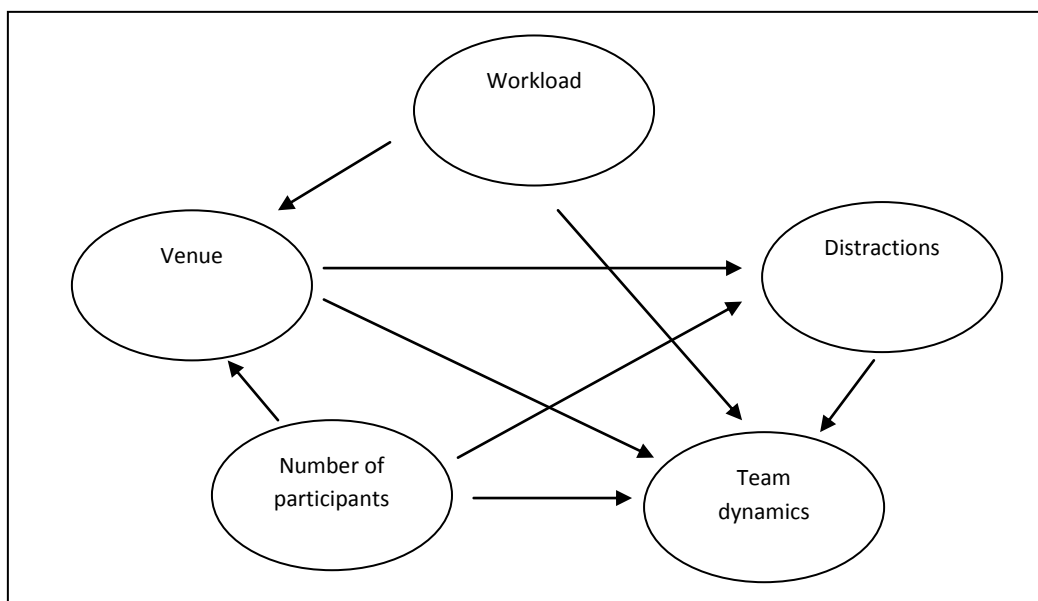


Figure 26: Relationship between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS

WORKLOAD strongly influenced *VENUE* and *TEAM DYNAMICS*.

VENUE moderately influenced *TEAM DYNAMICS* and strongly influenced *DISTRACTIONS*.

DISTRACTIONS strongly influenced *TEAM DYNAMICS*.

NUMBER OF PARTICIPANTS moderately influenced *VENUE*, *TEAM DYNAMICS* and *DISTRACTIONS*.

5.2.3.1 Workload

The participants' workload was important for a few reasons. A heavy workload meant that there was little time to prepare for handover and that there would be many unsorted patients to handover. A heavy workload also meant that handover was usually late and the time allocated for handover was shorter.

WORKLOAD strongly influenced *VENUE*. A heavy workload meant that sometimes handovers were conducted away from the designated clinical handover room.

REG AR stated that sometimes, if he had waited for a while, he would go down to DEM (Department of Emergency Medicine) to get handover and to start admissions.

INT AT stated that sometimes when she came on during night shift, if the evening shift was very busy, she would just wait on the couch. When the outgoing intern arrived, he or she would just sit on the couch, have something to drink or complain about the shift and then conduct a quick handover on the couch.

WORKLOAD also strongly influenced *TEAM DYNAMICS*. If there was not a heavy workload, the registrars and interns would commonly arrive at the clinical handover room together to meet the incoming team. If the workload was heavy, often the registrar and intern would arrive at different times and the handover would occur in an ad-hoc manner which impacted significantly on team dynamics.

INT EM stated that if she had work to finish, then she would stay to finish the work and handover to the next intern when she was done. In that instance, she did not know which patients her registrar had handed over as their handovers were separate.

REG SS stated that when the intern was not around, then the working of the team for handover was significantly impacted as the intern would have the most up to date knowledge of the condition of the patients that he (the registrar) admitted.

5.2.3.2 Venue

The venue for clinical handover was the same as in Phase One. All interns and registrars considered the current designated handover room adequate other than occasionally noise from the peak hour traffic could be heard.

VENUE moderately influenced *TEAM DYNAMICS* at clinical handover. REG AB has indicated that use of the designated handover room helped improve *TEAM DYNAMICS* as it facilitated joint discussions between members of the team in the care of the patient.

REG AB indicated that he would always insist on using the designated clinical handover room as when clinical handover room was used, then all team members were there and they could have a clear understanding of how they could divide the jobs. When clinical handover occurred outside of the designated room, interns and registrars often conducted separate handovers.

INT MK indicated that if handover occurred on the couch among interns, then the registrars would normally handover near the bar bench and therefore there was no discussion between the two groups.

VENUE strongly influenced **DISTRACTIONS**. The current clinical handover room is situated away from the clinical work area which was important in minimising interruptions. Previously (before the commencement of this research project), when the clinical handover room was situated close to the clinical work area, nurses and other clinical staff would interrupt the handover session by entering and exiting the room. **INT SP** had also illustrated the relationship between **VENUE** and **DISTRACTIONS** by indicating that there were usually less disruptions when clinical handover was conducted in the designated clinical handover room.

INTSP indicated that if the designated clinical handover room was used, then the disruptions were less compared to handover occurring near the TV or in the kitchen.

VENUE was influenced by **WORKLOAD** (see Section 5.2.3.1) and **NUMBER OF PARTICIPANTS** (see Section 5.2.3.4).

5.2.3.3 Distractions

External distractions, especially non-urgent pages by other healthcare staff during clinical handover appeared to be less frequent as there had been efforts made by the department to communicate to other healthcare professionals about the need for less distractions at clinical handover.

REG SJ stated that there had been notices for nursing staff to not page medical staff during the handover period unless it is absolutely necessary.

INT SH stated that there were few non-urgent pages which interrupted the handover and often nurses understand it when mentioned that they should try to reduce paging during that period.

Participants indicated that there was an understanding now that consumption of breakfast was no longer allowed during clinical handover. Participants also indicated that secondary discussions held by interns were occurring less frequently when the formal handover was taking place.

INT EM stated that "side handovers" at the other end of the table happened less now.

INT SP however corrected that statement by stating that it was still happening often on Monday when there was a break for a few days.

DISTRACTIONS strongly influenced **TEAM DYNAMICS**. If a team member had to leave the handover session to answer a page, the other team members were then unclear as to whether the information that had already been handed over was complete and it took time to clarify things after the handover session.

REG MW mentioned that he did not like interns leaving the room to answer pager. Interns then would come back and need to receive handover from the registrar again regarding their tasks.

DISTRACTIONS was influenced by *VENUE* (see Section 5.2.3.2) and *NUMBER OF PARTICIPANTS* (see Section 5.2.3.4).

5.2.3.4 Number of participants

The number of participants remained an issue for the registrars and interns. The room that had been allocated for handover did not allow for a large number of participants. Medical students also rarely attended handover in Phase 2. There was a previous attempt to involve other healthcare professionals with a change of venue but that was not successful.

NUMBER OF PARTICIPANTS moderately influenced *VENUE*. Morning handovers were always held in the handover room as that was the handover with the largest number of participants. Evening and night handovers tended to be held in other areas like the kitchen or the lounge area as there were fewer participants involved.

REG AB mentioned that morning handover due to the number of participants were always in the handover room to accommodate everyone while other handover time, one could use any spaces available as there were only a few of them.

NUMBER OF PARTICIPANTS also moderately influenced *DISTRACTIONS*. When there were many participants attending handover, there tended to be more distractions as participants who thought that the information that was being presented was irrelevant were doing other things like checking results or printing patient lists.

INT EM mentioned that in the morning, if there were many people there, it was very difficult to hear at times as people would be doing other tasks like using computers or printing patient lists.

NUMBER OF PARTICIPANTS moderately influenced *TEAM DYNAMICS*. If all participants who attended clinical handover participated actively and paid attention to what is said, it facilitated good discussions amongst the team. However, if participants were distracted and were not paying attention and participating, it affected the team that was delivering the handover information and the other participants in the handover session.

REG SS mentioned that if there were many people attending handover, including a few interns and medical students per team, it was then unclear who was responsible to write down tasks or who was doing what.

5.2.3.5 Team dynamics

In the Department of General Internal Medicine, different participants played different roles within their team in providing patient care. The interns, registrars and consultants worked together in a team and therefore team dynamics was important in clinical handover and patient care.

TEAM DYNAMICS was influenced by *WORKLOAD* (see Section 5.2.3.1), *VENUE* (see Section 5.2.3.2), *DISTRACTIONS* (see Section 5.2.3.3) AND *NUMBER OF PARTICIPANTS* (see Section 5.2.3.4).

5.2.3.6 Preliminary findings from core category ENVIRONMENTAL CONSIDERATIONS

Table 13 provides a summary of the unilateral relationships between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

The axial code	Influenced the axial code	Phase Two
Workload	Venue	Strong
	Distractions	-
	Number of participants	-
	Team dynamics	Strong
Venue	Distractions	Strong
	Number of participants	-
	Team dynamics	Moderate
	Workload	-
Distractions	Number of participants	-
	Team dynamics	Strong
	Workload	-
	Venue	-
Number of participants	Team dynamics	Moderate
	Workload	-
	Venue	Moderate
	Distractions	Moderate
Team dynamics	Workload	-
	Venue	-
	Distractions	-
	Number of participants	-

Table 13: Summary of relationships between axial codes in core category ENVIRONMENTAL CONSIDERATIONS

The following presents the preliminary findings from core category ENVIRONMENTAL CONSIDERATIONS:

1. Workload appeared to be an important issue as it influenced venue and team dynamics (see Section 5.2.3.1).
2. Venue influenced team dynamics and distractions (see Section 5.2.3.2)
3. There appeared to be less external distractions during clinical handover (see Section 5.2.3.3).
4. Team dynamics was extremely important in clinical handover sessions and was influenced by a participant's workload, venue and distractions (see Section 5.2.3.5).
5. Participants needed to see the relevance of the information presented at clinical handover otherwise their attendance and behavior at clinical handover could be a distraction (see Section 5.2.3.4).

5.2.4 Clinical handover experiences

CLINICAL HANDOVER EXPERIENCES was the fourth core category identified in Phase Two and refers to the participants' practical experiences of being involved in clinical handover at the Department of General Internal Medicine.

There were six axial codes associated with this core category. These axial codes are defined as follows:

- *ATTENDANCE* refers to the participant's physical presence at clinical handover.

- *SUPPORT* refers to clinical handover sessions being used as a means for personal well-being and professional development.
- *EDUCATIONAL COMPONENT* refers to clinical handover sessions being used to provide education and training in patient care for the participants.
- *STRUCTURE* refers to the format of the clinical handover session. This includes the order of proceedings and agenda during a clinical handover session.
- *INFORMATION TRANSFER* refers to the process of passing patient information from one person to another or one team to another. It also refers to the content of information that is passed on.
- *CLINICAL HANDOVER OUTCOMES* refers to whether the clinical handover process has delivered on the pre-designated goals and aims.

Figure 27 provides an illustration of the relationship between axial codes in this core category *CLINICAL HANDOVER EXPERIENCES*.

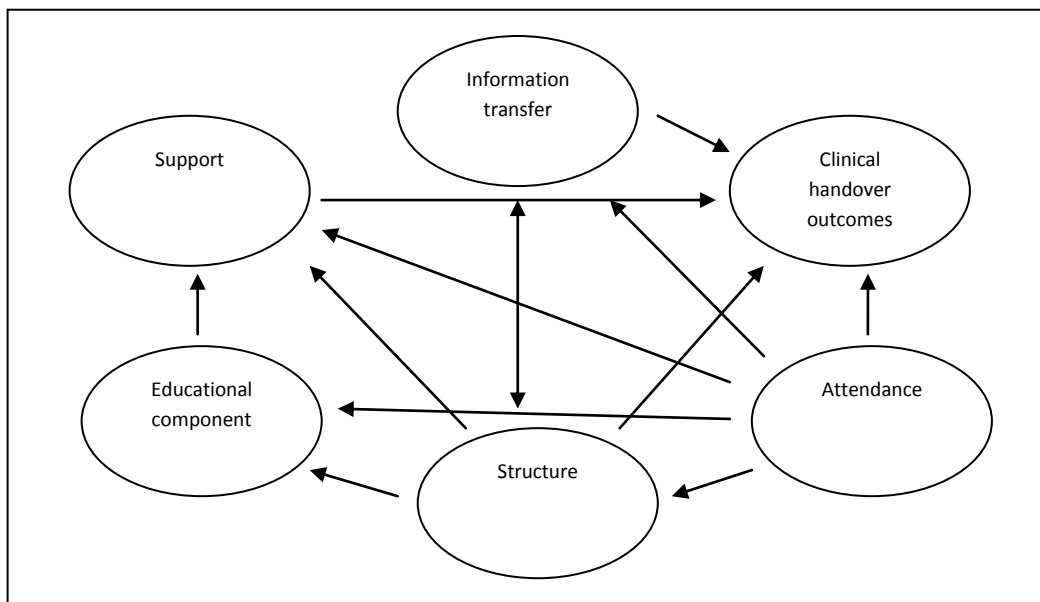


Figure 27: Relationship between axial codes in the core category *CLINICAL HANDOVER EXPERIENCES*

ATTENDANCE strongly influenced *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE* and moderately influenced *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*.

SUPPORT strongly influenced *CLINICAL HANDOVER OUTCOMES*.

EDUCATIONAL COMPONENT strongly influenced *SUPPORT*.

STRUCTURE moderately influenced *SUPPORT*, *EDUCATIONAL COMPONENT*, *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*.

INFORMATION TRANSFER moderately influenced *INFORMATION TRANSFER* and strongly influenced *CLINICAL HANDOVER OUTCOMES*.

5.2.4.1 Attendance

The clinical handover guidelines had provided a list of participants expected to attend morning handover (see Figure 28). However, it was found during the focus groups that not all expected participants turned up for morning handover.

Expected participants

- *All general medical interns and registrars*
- *Evening and night medical seniors*
- *Night intern and night medical registrar*
- *Post-take consultant physician*
- *Advanced trainees in medicine specialties*

Figure 28: Expected participants at morning handover

ATTENDANCE strongly influenced **SUPPORT**. The presence of consultants and registrars often provided the necessary support for interns to discuss patient care. This was a very strong relationship as the absence of consultants and registrars means that no support was provided at handover for interns.

INT EM mentioned that it would be good to have at least a registrar present so that difficult cases for intern handover could be discussed with registrars at that time.

ATTENDANCE strongly influenced **EDUCATIONAL COMPONENT**. The presence of consultants and registrars contributed to the educational component of handover. However, this relationship was highly dependent on other factors. **REG MW** indicated that the **EDUCATIONAL COMPONENT** was time dependent whereas **INT AT** indicated that it was dependent on the consultant.

REG MW mentioned that certain consultants were very good in handover as they provide teaching to junior staff but that only happened intermittently when there was enough time.

INT AT mentioned that some consultants did not teach at all even if they attended handover but some consultants tried instil some teaching every time they attended handover which made handover more valuable to interns.

ATTENDANCE strongly influenced **STRUCTURE**. Attendance by consultants and registrars influenced the structure of the clinical handover session. When consultants were present at clinical handover or registrars who were senior and well respected by their peers were present at clinical handover, the clinical handover process often followed a set structure. When they were absent, handover could be chaotic and usually occurred without a set structure. There was a strong relationship between **ATTENDANCE** and **STRUCTURE** although this relationship was more reliant on the interests of the consultants and registrars.

INT MK stated that he preferred if consultants did not attend handover as it usually took a much longer time if they did. When there were no consultants or interested registrars, then handover finished in no time and they could get on with their jobs.

REG SS stated that he hoped that all consultants would attend handover as it tends to be better organised.

ATTENDANCE moderately influenced INFORMATION TRANSFER. Written information was often available for interns and while attendance might impact on information transfer, a failure to attend handover did not necessarily mean a failure to transfer information. Registrars on the other hand viewed that attendance was extremely important to ensure information transfer, as most of the information transferred for registrars occurred during face-to-face clinical handover sessions.

INT FP stated that the handover information as often written on pieces of paper for the weekend shifts and therefore the presence of staff during a weekend shift might not be that important for transfer of information.

REG SJ stated that the presence of staff was very important to ensure good information transfer as the written handover does not necessarily contain all the required information.

ATTENDANCE also moderately influenced on CLINICAL HANDOVER OUTCOMES. Both the registrars and interns agreed that attendance was important to ensure good clinical handover.

INT SH mentioned that ideally, all staff on the team should be present and that would make handover complete.

REG SS stated that the presence of a consultant made handover more important in the minds of junior staff and they were more likely to take it seriously.

It was interesting to note that participants, including the interns did not see clinical handover as pure information transfer as the attendance of their seniors might not change the information transferred but might alter the outcomes of clinical handover. Clinical handover was therefore more than pure information transfer.

5.2.4.2 Support

Participants viewed support as an important component of clinical handover. Participants indicated that the clinical support provided during clinical handover was an important element of a good handover. This included supervision, providing second opinions and seeking advice. SUPPORT therefore strongly influenced the CLINICAL HANDOVER OUTCOMES.

INT FP mentioned that he appreciated the good advice and supervision provided by some registrars and consultants during handover time.

INT SH emphasised the fact that without support provided during handover, patients might not receive the ideal care as the interns might not see the registrar much again after handover time.

REG SJ indicated that supportive consultants provided good advice and teaching important components of handover.

SUPPORT was influenced by ATTENDANCE (see Section 5.2.4.1), EDUCATIONAL COMPONENT (see Section 5.2.4.3) and STRUCTURE (see Section 5.2.4.4).

5.2.4.3 Educational component

EDUCATIONAL COMPONENT provided in handover is important for the participants in regard to their professional development and well-being. However, they did not see the presence or lack of the educational component as impacting on the outcomes for patient care. Participants wanted the

educational component in handover to be done through the teaching of cases discussed during handover instead of setting aside a specific time for review.

EDUCATIONAL COMPONENT strongly influenced *SUPPORT*. Participants identified the provision of some teaching with the cases presented at clinical handover as a way to support them for providing better patient care in the future.

***INT SH** indicated that while discussions about how the cases were presented and advice about how to deal with these cases helped her to provide better patient care, she did not think that it was an essential element of clinical handover.*

***REG BA** stated that he often provided some teaching but also learnt a lot from the teaching provided by consultants during handover. This helped him better manage patients.*

EDUCATIONAL COMPONENT was influenced by *ATTENDANCE* (see Section 5.2.4.1) and *STRUCTURE* (see Section 5.2.4.4).

5.2.4.4 Structure

Discussions with the clinical handover project registrar confirmed that there had been no changes to the recommended structure of clinical handover in the department guidelines.

Participants in the focus groups revealed that most of the time, clinical handover did follow the recommended structure at morning handover. Some registrars had a better idea about the structure as they often led the clinical handover sessions.

***REGS MW** and **BA** stated that they were familiar with the structure and followed it as closely as possible. However, they sometime had to make adjustments if there were too many patients that had to be discussed at handover.*

Interns on the other hand were not as clear about the handover structure as they were not normally actively involved in clinical handover.

***INT SP** was surprised that the department actually had a structure for clinical handover as she was unaware of it.*

Apart from the morning handover, there was not a recommended structure for evening and night handovers.

***REG SJ** stated that for the evening and night handovers, the two registrars usually just did whatever they felt comfortable with and he saw no harm in that.*

***INT FP** stated that for the evening and night handovers, the interns handed over to interns and registrars handed over to the registrars without much structure.*

STRUCTURE moderately influenced *EDUCATIONAL COMPONENT*. The structure of clinical handover influenced whether there time for education during clinical handover. If participants adhered to the recommended structure, clinical handover was completed in a more efficient manner and there was some time available during the allocated handover time for education.

***REG MW** indicated that when handover followed a structure, it was clearer and seemed to take less time which could be used for case discussions.*

There was a reciprocal relationship between *STRUCTURE* and *INFORMATION TRANSFER*. The structure available ensured better information transfer but at the same time if there was adequate information transfer, it meant that the participants adhered to the recommended structure of clinical handover.

INT EM mentioned that she was taught something about a format to provide information transfer of patient and that was very helpful.

REG AR mentioned that if information transfer of patient was succinct, it was more likely that all components of clinical handover could be achieved as they would not run out of time.

STRUCTURE moderately influenced *CLINICAL HANDOVER OUTCOMES* due to the fact that a structure provides the ability to ensure that all aspects of handover are dealt with.

REG AB mentioned that the structure during morning handover was good as it allowed all aspects of handover to be covered.

INT EM stated that structured handover in the morning allowed interns some opportunity to participate while sometimes, the structure was not followed and interns were ignored during handover.

STRUCTURE was influenced by *ATTENDANCE* (see Section 5.2.4.1) and *INFORMATION TRANSFER* as indicated above.

5.2.4.5 Information transfer

The way in which information was transferred and the content that was transferred varied between registrars and interns. Registrars wanted some discussion about the patients from one team to the other and the format for that transfer of information was important for the registrars. Registrars also valued face-to-face meetings in transferring information. Interns on the other hand often felt that they only required asynchronous information transfer from the outgoing team to the incoming team. Most interns were happy with that although some preferred face-to-face discussions.

REGS MW and AB stated that information transfer during handover must happen face to face in order to discuss patients. They did not see paper-based information transfer without face to face discussion as adequate. All other registrars agreed with this point.

INTS FP and SP mentioned that they were happy with paper based information transfer without seeing the need for discussions.

INTS EM and SH stated that they preferred an opportunity for some discussion if possible.

INFORMATION TRANSFER had a very strong relationship with *CLINICAL HANDOVER OUTCOMES*. Participants viewed information transfer as a core activity which defined the outcomes of clinical handover.

REGS MV and AB emphasised the need to get information transfer right in order to ensure good patient care.

INTS EM and SP mentioned that good information transfer will make their job easier and achieve better outcomes.

INFORMATION TRANSFER was influenced by *ATTENDANCE* (see Section 5.2.4.1) and *STRUCTURE* (see Section 5.2.4.4).

5.2.4.6 Clinical handover outcomes

It appeared that registrars and interns wanted different outcomes from clinical handover. Registrars wanted to obtain a clear understanding of the patient that they were looking after and the issues that they had to deal with as the main outcome of clinical handover. Interns on the other hand wanted only a list of the patients and tasks to be completed. Further analysis of the data indicated that providing some understanding of the team and the environment also seemed as important issues in *CLINICAL HANDOVER OUTCOMES*.

REG AR indicated that at the end of handover, he should have a clear idea of the patients that he needs to look after and who the sick ones are.

INT EM mentioned that they needed a list of tasks and patients as well as knowing priority of patient to work with during handover.

CLINICAL HANDOVER OUTCOMES was influenced by *ATTENDANCE* (see Section 5.2.4.1), *SUPPORT* (see Section 5.2.4.2) and *INFORMATION TRANSFER* (see Section 5.2.4.5).

5.2.4.7 Preliminary findings from core category *CLINICAL HANDOVER EXPERIENCES*

Table 14 provides a summary of the unilateral relationships between the axial codes in the core category *CLINICAL HANDOVER EXPERIENCES*.

The axial code	Influenced the axial code	Phase Two
Attendance	Support	Strong
	Educational component	Strong
	Structure	Strong
	Information transfer	Moderate
	Clinical handover outcomes	Moderate
Support	Educational component	-
	Structure	-
	Information transfer	-
	Clinical handover outcomes	Strong
	Attendance	-
Educational component	Structure	-
	Information transfer	-
	Clinical handover outcomes	-
	Attendance	-
	Support	Strong
Structure	Information transfer	Moderate
	Clinical handover outcomes	Moderate
	Attendance	-
	Support	Moderate
	Educational component	Moderate
Information transfer	Clinical handover outcomes	Strong
	Attendance	-
	Support	-
	Educational component	-
	Structure	Moderate
Clinical handover outcomes	Attendance	-
	Support	-
	Educational component	-
	Structure	-
	Information transfer	-

Table 14: Summary of relationships between axial codes in core category *CLINICAL HANDOVER EXPERIENCES*

The following presents the preliminary findings from core category CLINICAL HANDOVER EXPERIENCES:

1. Attendance at clinical handover sessions was vital as it influenced support, educational component, structure, information transfer and outcomes (see Section 5.2.4.1).
2. Support was an important element of clinical handover sessions and it was perceived to influence clinical handover outcomes (see Section 5.2.4.2).
3. Educational component provided during clinical handover sessions done through the teaching of cases discussed during clinical handover was valued by the junior doctors (see Section 5.2.4.3).
4. Clinical handover followed the recommended structure set out in the clinical handover guidelines but only for morning handover (see Section 5.2.4.4).
5. Participants wanted different outcomes from clinical handover sessions depending on the role they played in patient care (see Section 5.2.4.6).

5.2.5 User requirements

USER REQUIREMENTS was the fifth core category identified and refers to the users' perceptions of their information needs in order to improve clinical handover.

There were five axial codes in this core category. These axial codes are defined as follows:

- *DOCUMENTATION* refers to the availability of archived information on clinical handover.
- *ACCESS* refers to the users being able to view, edit and update available clinical handover information.
- *INFORMATION* refers specifically to patient details used during clinical handover.
- *PRIORITISATION* refers to the ability for users to be alerted to important tasks through the clinical handover process.
- *TOOLS* refers to artefacts which assist in the process of clinical handover.

Figure 29 provides an illustration of the relationship between axial codes in the core category USER REQUIREMENTS.

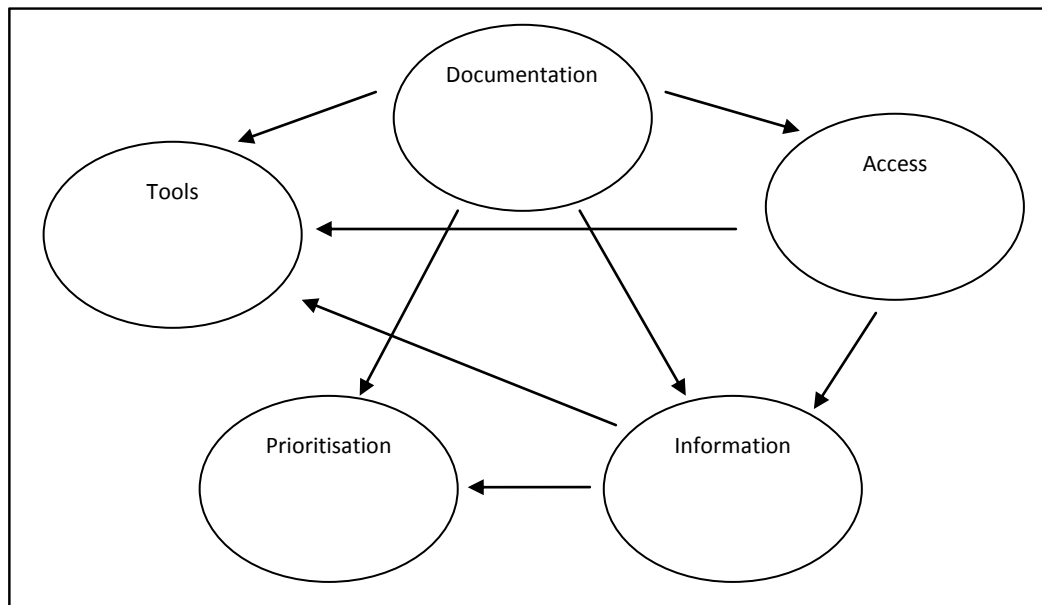


Figure 29: Relationships between axial codes in the core category USER REQUIREMENTS.

DOCUMENTATION strongly influenced *ACCESS*, *INFORMATION*, *PRIORITISATION* and *TOOLS*.

ACCESS strongly influenced *INFORMATION* and *TOOLS*.

INFORMATION strongly influenced *PRIORITISATION* and *TOOLS*.

5.2.5.1 Documentation

Participants confirmed that there was no current formal documentation of clinical handover. Participants currently jotted down notes on scrap pieces of paper or on the patient list. Participants indicated that good documentation of clinical handover notes was essential in clinical handover improvement. The documentation of clinical handover notes needed to include the person who was responsible for the care of the patient in order to create an audit trail.

REG MW stated that from a registrar's perspective, good clinical handover must include a formal documentation of what happened at handover.

REG AR clarified that who has accepted patient care needed to be documented.

Other registrars all agreed with this requirement.

INTS EM and SH stated that it was important to clearly document which task had been handed over and which intern was responsible for completing that task.

DOCUMENTATION strongly influenced *ACCESS*. Participants did not have ready access to clinical handover notes that were scribbled on scrap pieces of paper as they were either held by someone or was lost. In the event of a weekend or extended holidays, there were so many pieces of paper accumulated that some might have been lost in the process.

***INT EM** mentioned that often handover notes scribbled on pieces of paper were misplaced and the interns would not know what tasks had to be done.*

***INTS SP, SH and FP** added that if handover was documented properly on a piece of paper, then it was easier to access that information and complete the tasks in a more timely manner.*

***REGS AR, AB and SJ** argued that they found handover worked better if the outgoing registrar prepared and provided a summarised version of the information per patient compared to just handing over the entire stack of admission notes or worse still, did not provide any documentation at all.*

DOCUMENTATION strongly influenced **INFORMATION**. When the patient list or admission notes were used for clinical handover, the information that is provided to the next team might be in greater detail.

***REG MW** mentioned that some registrars would photocopy the admission note and some would create detailed handover notes. These notes provided more information at clinical handover.*

***INT EM** mentioned that sometimes the handover notes consisted of scrap pieces of paper with the patient stickers or the patient's name scribbled on it. The information was often hard to read.*

DOCUMENTATION strongly influenced **PRIORITISATION**. Registrars sometimes handed over separate lists of patients – one usually highlighted the sick patients who required urgent attention and another contained patients who just required a routine review. This helped with the prioritisation of patients. Some interns used other mechanisms to indicate which patients should be prioritised first.

***REG SJ** mentioned that sometimes, he received two sheets of patient handovers with an urgent list and a routine review. This helped him to get jobs done.*

***INT FP** stated that some interns used a highlighter and different colour ink to indicate the prioritisation of care. He said that, however, the amount of information transferred between interns made it difficult, often to find the urgent tasks.*

***INTs EM and SH** agreed and mentioned that it would be ideal if for handover tasks to be prioritised and easily identifiable through a documentation process.*

Participants indicated that proper documentation of handover should also include the prioritisation of patient care.

Finally, **DOCUMENTATION** strongly influenced **TOOLS**. Interns used different tools compared to registrars. Registrars commonly used admission notes but interns never used admission notes for handover. Therefore, the choice of tool used must be able to provide good documentation which can be used by different clinicians with different needs in clinical handover improvement.

***REG AB** mentioned that a photocopy of the admission notes was useful for handover for registrars, however, there might be too much detail for interns.*

5.2.5.2 Access

ACCESS appeared to be an important issue in clinical handover amongst the participants. Currently, participants were not able to simultaneously access and update the clinical handover information. Quite often, different participants might provide different updates during the shift and this was

then handed over to the next team in an uncoordinated manner. The participants felt that simultaneous access would be an important aspect in clinical handover improvement.

REGS AR, AB and SJ went on to indicate that ideally clinical handover information should be available at all times and also allow for different clinicians to access that information.

INTS EM, SP and FP emphasised the importance of simultaneous access and the ability to update the information as currently, there might be two different versions of clinical handover notes for the same patient by two different interns working on the same shift.

INT SP also stated that the access is vital and currently two different interns try not to see the same patient within the same shift as it becomes difficult to update handover and patient information.

ACCESS strongly influenced **INFORMATION**. The ability to access updated handover information might impact on the information transferred at clinical handover. The registrars indicated that most of the time, they could remember the information off the top of their heads apart from the patient demographic details. Interns however depended on their clinical handover artefacts in order to transfer information at clinical handover. Participants therefore believed that information availability was affected by access and improvement in access to information during clinical handover would improve the clinical handover process.

REG SJ mentioned that they could normally remember their own admissions and therefore they would just need the admission list rather than handover documentation. It would therefore be ideal if a tool could be used for handover which would bring up a list of recently admitted patients and the handover details of these patients.

INTS SP and AT stated that access to their own notes for handover was important to ensure good information transfer. They, however mentioned that sometimes it was difficult as their own handover notes might be lost. A system to allow notes written on the ward to be available during clinical handover time in handover room would be ideal.

ACCESS also had a strong influence on **TOOLS**. Currently, in order to access clinical handover notes, participants either made their own notes on pieces of paper or made a copy of the handover information provided and divided the workload so that each participant had access to the information that he/she needed. Some participants typed up MS Word documents which were updated at the end of the shift so that other interns and registrars could get access to the handover documents.

REG AB stated that he usually makes it a point to type up the handover notes and so that other staff could check and use that information

Intern EM stated that she normally photocopied the handover information and then update the information at the end of the shift, but would make a copy available in the handover room for the others.

Intern SP and SH stated that an electronic record of some sort would be helpful to allow simultaneous access.

Participants felt that ready access to clinical handover information was important and believed that an electronic tool might assist in the process.

5.2.5.3 Information

Participants provided the information that they required at clinical handover. Some of the information related to patient demographics while other information related to their admission into hospital. The information available and utilised at clinical handover was affected by the documentation process. This relationship was described above. It was not a strong relationship as participants could find other ways of obtaining the information required if the information was not properly documented. However, participants would like these information to be available and properly documented for clinical handover improvement.

REG MW mentioned that there were three parts to handover information, patient demographics, what clinicians think the issues were and how urgent the care needed to be provided.

REG AB mentioned that it would be good to have blood tests and radiology results.

INTS EM and SH mentioned that they wanted patient name, age, hospital number, consultants and ward location to be available as basic data. Then they mentioned that diagnosis and tasks should be available.

INT SP added that some idea of what the home team wanted to be done would be good. I

INTS SP and AT added that the urgency to complete the tasks was important as well.

INFORMATION strongly influenced **PRIORITISATION**. The content of the information allowed participants to better prioritise their tasks. This relationship was important for both the registrars and interns. As such, the prioritisation process was very important for clinical handover improvement as part of delivering information.

REG AR stated that if sick patients were presented first and in greater detail then the registrar and consultants would be more aware of the urgency of the situation.

REGS MW, SJ and AB agreed with the need to cover in greater detail information regarding sick patients in order to flag this to the next team.

INTS AT and EM stressed the need to make sure sick patients were discussed and handed over first and highlighted to the following team. As interns normally handed over a significant amount of information, unless the important information was stressed, it might not be acted upon quickly. All other interns agreed.

INFORMATION also strongly influenced **TOOLS**. In order to handover the information required, different tools were used to cope with the current system of handover. For example, A4 pieces of paper were commonly used with patient stickers attached so that participants can remember which patients to handover. Some teams used a pro-forma for written handover. Other teams developed their own electronic handover sheets. Registrars commonly photocopied handover admission notes which they used for handover. Some registrars would type up the information and distribute that information to the team who was taking over the care of the patient.

***REG AR** mentioned that some registrars would type up important information about patients and hand over that in addition to verbal discussions. REG AR found that very useful. The other registrars agreed.*

All registrars agreed that it was difficult to remember information and therefore they commonly photocopied admission notes for handover. They stated that typed information would be good as sometimes the writing can be hard to read.

***INT EM** mentioned that they commonly carried multiple pieces of papers to stick patient stickers on and to write short notes about them. It would be nice that they could access these electronically but still be able to print them out.*

***INT FP** stated that they sometimes typed the information into a proforma for handover. It would be nice to have that information available through a tool at which all clinicians could update the information.*

It became evident that participants wanted a tool that was efficient and effective in delivering the information required for clinical handover.

5.2.5.4 Prioritisation

INFORMATION had a strong reciprocal relationship with *PRIORITISATION*. The transfer of information during clinical handover alerted the incoming team of sick patients and allowed for the prioritisation of patient care to be carried out after clinical handover. The need to alert the incoming team of sick patients significantly impacted on information transferred during handover. This not only affected the sequence in which the information was transferred but also the detail and structure of the information transferred.

***REG AB** stated that in order to identify sick patients, the patient information was presented first, and in more detail. Furthermore, commonly, the emphasis was how sick the patient was and what evidence to support that conclusion.*

***INT SP** mentioned for sick patients, the information provided was a lot more detailed as well as highlighting them to ensure incoming team understood the seriousness of the problem.*

PRIORITISATION was influenced by *DOCUMENTATION* (see Section 5.2.5.1), *INFORMATION* (see Section 5.2.5.3) and has a reciprocal relationship with *TOOLS* (see Section 5.2.5.5).

5.2.5.5 Tools

Many different information artefacts were used in clinical handover. This included admissions notes, A4 pieces of paper with patient stickers, handwritten information, computer print-outs, patient lists and electronic documents.

The documentation of clinical handover affected the tool that was used but participants requested for more appropriate tools to support the documentation of handover. They requested tools which would archive the information and allowed for retrieval at different sites within the hospital.

The current system of clinical handover provided limited access to handover documentation. Participants believed that a tool which could provide simultaneous access to updated clinical handover information was important. Participant wanted a tool that would provide structured information and prioritisation of patients.

REGS MW and **AB** mentioned that the tool to improve handover must provide some sort of structure in presenting the information to make it easier to search for the information that they require.

REG MW also went on to add that multiple clinicians should be able to access the information at the same time and be able to search for the information required again at a later date.

INTS EM and **AT** wanted a tool which that could be updated constantly to provide a list of urgent tasks to be completed.

Participants also expressed the need for the tool to be available close to the clinical areas in the hospital. Some participants indicated their desire for electronic tools while others were less specific. Participants indicated that electronic tools would be ideal if it was straightforward and easy to use.

TOOLS was influenced by **DOCUMENTATION** (see Section 5.2.5.1), **ACCESS** (see Section 5.2.5.2) and **INFORMATION** (see Section 5.2.5.3).

5.2.5.6 Preliminary findings from core category USER REQUIREMENTS

Table 15 provides a summary of the unilateral relationships between axial codes in the core category **USER REQUIREMENTS**.

The axial code	Influenced the axial code	Phase Two
Documentation	Access	Strong
	Information	Strong
	Prioritisation	Strong
	Tools	Strong
Access	Information	Strong
	Prioritisation	-
	Tools	Strong
	Documentation	-
Information	Prioritisation	Strong
	Tools	Strong
	Documentation	-
	Access	-
Prioritisation	Tools	Strong
	Documentation	-
	Access	-
	Information	Strong
Tools	Documentation	-
	Access	-
	Information	-
	Prioritisation	Strong

Table 15: Summary of relationships between axial codes in core category **USER REQUIREMENTS**

The following presents the preliminary findings from core category **USER REQUIREMENTS**:

1. Good documentation of clinical handover notes was essential in clinical handover improvement as it influenced access, information, prioritisation and tools. There was no formal documentation of clinical handover notes in the Department (see Section 5.2.5.1).
2. Participants had problems accessing clinical handover notes that were written in an adhoc manner (*SEE SECTION 5.2.5.2*).

3. Information required from clinical handover needs to be documented appropriately and available when required (see Section 5.2.5.3). When the information was incomplete or unavailable, it affected the prioritisation of patients (see Section 5.2.5.4).
4. There are a variety of tools to support clinical handover but based on the user requirements identified, it appears that an electronic tool would be able to cater to their needs (see Section 5.2.5.5).

5.3 Relationship between core categories in Phase Two

This section provides a detailed description of the five core categories which emerged from the coding process described in Chapter 3. These five categories are: DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS and CLINICAL HANDOVER EXPERIENCES, USER REQUIREMENTS.

The five core categories are defined as follows:

- DEPARTMENTAL REQUIREMENTS refers to both formal and informal directions instituted by the Department of General Internal Medicine for clinical handover. There are four axial codes associated with this core category – *POLICIES AND GUIDELINES*, *CLINICIAN ROLES*, *EDUCATION AND TRAINING* and *DEPARTMENT TRADITION*.
- PARTICIPANT ATTRIBUTES refers to the characteristics of the participants who are involved in handover. There are six axial codes associated with this core category: *UNDERSTANDING*, *EXPECTATIONS*, *INDIVIDUAL PERSONALITIES*, *COMMUNICATION STYLES*, *CULTURAL BACKGROUND* and *BEHAVIOUR*.
- ENVIRONMENTAL CONSIDERATIONS refers to the environment in which clinical handover is being conducted as well as environmental factors which impact on clinical handover. There are five axial codes associated with this core category: *WORKLOAD*, *VENUE*, *DISTRACTIONS*, *NUMBER OF PARTICIPANTS* and *TEAM DYNAMICS*.
- CLINICAL HANDOVER EXPERIENCES refers to the participant's experiences of handover at the Department of General Internal Medicine. There are six axial codes associated with this core category: *ATTENDANCE*, *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE*, *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*.
- USER REQUIREMENTS refers to the users' perceptions of their information needs in order to improve clinical handover. There are five axial codes associated with this core category: *DOCUMENTATION*, *ACCESS*, *INFORMATION*, *PRIORITISATION* and *TOOLS*.

The relationships between these five categories are illustrated in Figure 30.

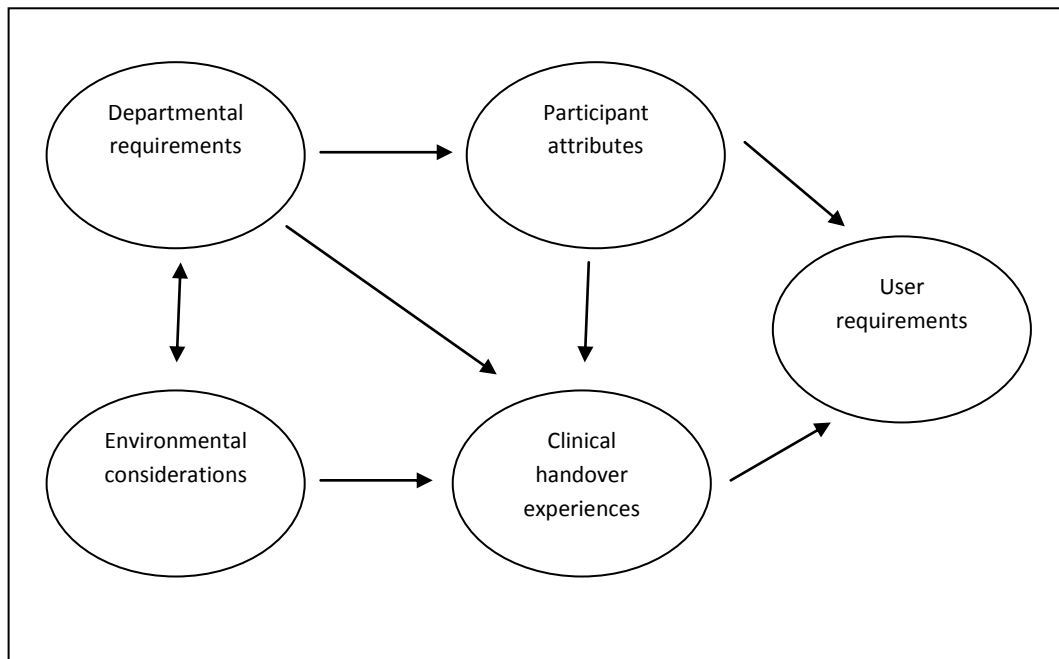


Figure 30: Relationship between core categories

DEPARTMENTAL REQUIREMENTS affected PARTICIPANT ATTRIBUTES. It appeared that *POLICIES AND GUIDELINES*, *DEPARTMENT TRADITION* and *EDUCATION AND TRAINING* of staff in clinical handover and the awareness created with the ongoing efforts to improve clinical handover had some impact on *UNDERSTANDING*, *EXPECTATIONS*, *COMMUNICATION STYLE* and to some extent *BEHAVIOUR*. This relationship however was not strong. In some instances, PARTICIPANT ATTRIBUTES were not related to DEPARTMENTAL REQUIREMENTS. DEPARTMENTAL REQUIREMENTS however had a strong reciprocal relationship with ENVIRONMENTAL CONSIDERATIONS. DEPARTMENTAL REQUIREMENTS determined *WORKLOAD*, *VENUE*, *DISTRACTIONS* and *NUMBER OF PARTICIPANTS* and these impacted on *TEAM DYNAMICS*. The impact of ENVIRONMENTAL CONSIDERATIONS on DEPARTMENTAL REQUIREMENTS is described below. DEPARTMENTAL REQUIREMENTS also shaped the CLINICAL HANDOVER EXPERIENCES of participants. This relationship was not strong however, partly due to the weak relationship between DEPARTMENTAL REQUIREMENTS and PARTICIPANT ATTRIBUTES. DEPARTMENTAL REQUIREMENTS provided the basis for *ATTENDANCE*, *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE* and *INFORMATION TRANSFER* at handover.

There was a weak relationship between PARTICIPANT ATTRIBUTES and DEPARTMENTAL REQUIREMENTS. PARTICIPANT ATTRIBUTES however played a significant role in CLINICAL HANDOVER EXPERIENCE. It not only affected an individual's handover experience but also affected many other participant's experience. It also changed the behaviours of others during handover. PARTICIPANT ATTRIBUTES also played a significant role in determining USER REQUIREMENTS.

ENVIRONMENTAL CONSIDERATIONS was related to DEPARTMENTAL REQUIREMENTS and CLINICAL HANDOVER EXPERIENCE. DEPARTMENTAL REQUIREMENTS had a considerable impact on ENVIRONMENTAL CONSIDERATIONS through *POLICIES AND GUIDELINES*, *EDUCATION AND TRAINING* and *DEPARTMENT TRADITION*. On the other hand, ENVIRONMENTAL CONSIDERATIONS, especially

VENUE and *DISTRACTIONS*, had considerable impact on *DEPARTMENTAL REQUIREMENTS*, especially *POLICIES AND GUIDELINES*. *ENVIRONMENTAL CONSIDERATIONS* had a direct impact on the handover experience of participants as it impacted on how handover was conducted and a participant's experience of handover.

CLINICAL HANDOVER EXPERIENCES played an important role in determining *USER REQUIREMENTS*. *CLINICAL HANDOVER EXPERIENCES* was affected by all the other core categories. While *DEPARTMENTAL REQUIREMENTS* and *ENVIRONMENT CONSIDERATIONS* impacted on *CLINICAL HANDOVER EXPERIENCES*, the strongest relationship lied between *PARTICIPANT ATTRIBUTES* and *CLINICAL HANDOVER EXPERIENCES*. Despite changes in *DEPARTMENT REQUIREMENTS* and *ENVIRONMENTAL CONSIDERATIONS*, the relationship between *PARTICIPANT ATTRIBUTES* and *CLINICAL HANDOVER EXPERIENCES* remained very strong. *PARTICIPANT ATTRIBUTES* impacted on not only the experiences of each individual but the whole team and handover sessions.

5.4 Chapter reflections

This chapter has provided an analysis of the data collected in Phase Two drawing on the principles of grounded theory. Five core categories have emerged from this analysis – *DEPARTMENTAL REQUIREMENTS*, *PARTICIPANT ATTRIBUTES*, *ENVIRONMENTAL CONSIDERATIONS*, *CLINICAL HANDOVER EXPERIENCES* and *USER REQUIREMENTS*. The relationships between the axial codes within each core category and the relationships between core categories were analysed.

Analysis of the data collected in Phase Two added further insights to the initial findings which emerged from Phase One. Firstly, different participants had a different understanding of clinical handover, especially in regard to information transfer about a patient. A registrar's responsibility was mainly to provide a diagnosis and therefore the transfer of patient information was different to that of an intern whose responsibility was mainly to complete the tasks required of them. As such, trialling an electronic tool was deemed to be more suitable at an interns' level as the tasks were better defined.

Secondly, clinical handover was found to serve various functions. To minimise the impact that the electronic tool would have on the existing functions of clinical handover, it was decided that the electronic tool should be designed as a support tool rather than as a replacement for the current clinical handover practice.

Thirdly, the importance of education and training was again highlighted and the lack of education and training possibly contributed to the differences in the understanding of clinical handover. As such, there was a need to not only provide education and training in the use of the electronic tool but at the same time provide education and training on the practice of clinical handover itself.

Finally, clinicians indicated in both phases that they wanted a tool that would allow them to document clinical handover notes properly, have access to the information when they needed, have some sort of structure available to facilitate information transfer and also some form of prioritisation to highlight the sick patients.

Given the above insights obtained, clinicians decided that an independent web-based electronic tool which was accessible via the hospital's intranet would be a good starting point to support clinical handover in clinical handover improvement. The electronic tool would be developed with interns to assist them in their handovers. A user manual and associated education and training in both the use of the electronic tool and the practice of clinical handover would be conducted. While Phases One and Two allowed for some basic understanding of user requirements, those requirements would need to be further delineated through design workshops.

Interns were invited to participate in the design workshops as they were the intended users of the electronic tool. Registrars were also invited to participate in the design workshops as they had indicated that they might need to have access to the clinical handover messages in the electronic tool as they play a supervisory role to the interns. Consultants were also invited to participate in the workshops as the electronic tool requires the endorsement of the consultants for it to succeed.

Chapter 6 provides a detailed account of the design workshops that were conducted to obtain the functional requirements for the development of the electronic tool. It also provides screen shots of the electronic tool.

Chapter 6 Electronic tool development

6.1 Introduction

This chapter provides a narration of how the electronic tool was built incorporating the insights generated from the observation sessions, semi-structured interviews and compilation of clinical handover notes analysed in Chapters 4 and 5. This process of continual engagement and involvement of users to develop the electronic tool was very important as it continued to contribute to the data collection in order to refine the understanding of clinical handover and clinical handover improvement from the users' perspectives.

- Section 6.2 provides an overview of the development of the electronic tool. It describes the user insights obtained from the semi-structured interviews, observation sessions and clinical handover notes in Phase One and focus groups in Phase Two and how these informed the development of the tool. It then provides an account of how the design workshops were conducted.
- Section 6.3 provides an identification and analysis of the functional requirements of the electronic tool from the users' perspectives.
- Section 6.4 highlights the issues that had to be considered when building the electronic tool. This section focused especially on the challenges encountered in the development of the electronic tool with the participants' varied backgrounds.
- Section 6.5 provides a description of the prototype of the electronic tool.
- Section 6.6 provides a description and screen shots of the electronic tool built after multiple iterative feedback and revision sessions conducted with the participants.
- Section 6.7 provides a discussion of incorporating an education and training program for clinical handover as part of the introduction of the electronic tool.
- Section 6.8 addresses the problems and challenges encountered in the development process. This section provides a discussion of the challenges faced by information systems researchers conducting research in a clinical setting in regard the development of an electronic tool.
- Section 6.9 provides a summary reflection of the chapter.

6.2 Overview of the development

Analysis of the data collected from the semi-structured interviews, observation sessions and compilation of clinical handover notes from Phase One and focus groups from Phase Two provided rich insight into the status of clinical handover in the Department of General Internal Medicine. Some of the key insights brought forward into the development of the electronic tool in Phase Two include:

- Clinical handover appeared to be in a state of disarray, especially for evening and night handovers. Face-to-face meetings sometimes do not occur in the evenings and it is important

to provide a mechanism for asynchronous handover communication as a back-up plan especially for evening handovers.

- Clinicians with different levels of seniority had different roles and different requirements at clinical handover sessions and therefore a decision was made to focus on developing the electronic tool primarily for the interns' use as their job functions were task-based and more routine as compared to registrars and consultants. Interns were also the ones who voiced their interest in trialing an electronic tool. However, as part of the over-arching user-centred approach used in this research, registrars and consultants were also invited to be part of the development of the electronic tool as registrars and interns work as a team to deliver patient and consultants had to endorse the electronic tool developed.
- The electronic tool was to be built as a support tool rather than as a replacement for current face-to-face meeting as participants had stressed the importance of face-to-face meetings to facilitate discussions at clinical handover. Clinical handover was also found to serve various functions apart from information transfer e.g. provide an opportunity for socialization, debriefing, provide an educational component and it was deemed important to maintain those functions through face-to-face meetings.
- There was currently no standard practice for clinical handover and the information transferred at clinical handover is highly dependent on the communication styles of the participants. As such, a standardised way of communication needed to be developed for the electronic tool as indicated by the participants.
- Participants in Phases One and Two indicated that there should be proper documentation in place of clinical handover notes as they have encountered problems with accessing and updating the clinical handover notes.
- Participants emphasised the lack of education and training in clinical handover. As such, it was important that education and training in clinical handover, as well as education and training in the use of the electronic tool be made available prior to introducing the electronic tool and as each new cohort of participants rotate to the department.

Three design workshops were conducted with registrars and interns drawing on the principles of participatory design with an additional workshop conducted with consultants during one of their departmental meetings in order to obtain their endorsement of the electronic tool. The aim of the design workshops was to engage users in the design of the electronic tool that fits in with the requirements for clinical handover improvement from the perspective of the users. The researcher used the core category USER REQUIREMENTS that emerged in the data analysis in Phases One and Two as a basis for further discussions during the workshops in assisting with the development of the electronic tool. User requirements were discussed in detail based on access, documentation, prioritisation, information and tools and how these requirements could be translated into the functional requirements of an electronic tool. This is elaborated in Section 6.3.

6.3 User identification of requirements and analysis

The analysis of the functional requirements of the electronic tool was informed by the core category USER REQUIREMENTS. Each of the axial codes in this core category was presented to the participants and discussed in regard to how this could be incorporated into the electronic tool. The researcher only acted as a facilitator and the participants were central to this process. Whenever there were differing opinions, users were encouraged to reach a consensus. Appendix 4 provides a list of the functional specifications that were provided to the software developers.

6.3.1 Access

Participants indicated that simultaneous access to clinical handover information as well as access to clinical handover information close to the point of care was important for clinical handover improvement. It was anticipated that the electronic tool provided a solution for the requirements for simultaneous access. Participants indicated that there were desktop computers and printers available in the ward areas which they normally used to access test results. One of the requirements of the electronic tool was therefore a networked system allowing for access through the hospital intranet.

Discussions arising from the workshops also indicated that access was a security issue and a legal requirement. Participants wanted some form of security measure to ensure that the information remained confidential. Participants also believed that only medical staff should be allowed to view and edit the information available on the electronic tool. As the hospital already provides each clinician with access to its various IT systems, participants emphasised the need for the electronic tool to utilise the same type of access to reduce the number of passwords that they need to remember in order to access the information.

At the conclusion of the workshops, the user requirements for access include:

- Simultaneous access by different users;
- Access near point of care;
- Secured access;
- Utilisation of current passwords for access; and
- Proper documentation.

6.3.2 Documentation

Participants indicated in Phase One and in the focus groups in Phase Two that they wanted proper documentation of clinical handover information. However, it was unclear at that stage that they wanted an electronic tool to help with documentation.

In the workshops, the participants further defined the meaning of clinical handover documentation in regard to the development of the electronic tool. Firstly, the participants did not want to use the current Digital Medical Record (DMR) infrastructure as according to them, it did not allow for them to enter information directly. It was used more as an archiving program where the written information was scanned into the system and stored and this information could be displayed if required.

Participants also indicated that they wanted a record of who entered the information and the time and date in which the information was entered. The electronic tool also had to allow for searches to be conducted and tracking to be done. These requirements proposed by the participants were consistent with the legal requirements of archiving clinical handover information for healthcare institutions in Australia. Participants only wanted the display of current clinical handover information for the current admission. They wanted the electronic tool to only display the patients with outstanding tasks, searchable via the medical unit that the patient was admitted under. They did not want documentation of the previous clinical handover or the previous admission to be displayed. This information was stored and made available to senior clinicians and the Head of Department for audit purposes.

Participants found it difficult to utilise the information available on the current paper based system. They were often paged about a particular patient and had to make decisions while responding to the page. Participants found it difficult and tedious to search through the stack of paper in front of them to look for the required information. As such, participants emphasised the need for proper documentation as well as the ability to retrieve information about a patient rapidly. When translated into functional requirements for an electronic tool, this implies that a search function for information relating to an individual patient and proper documentation of clinical handover messages for each patient but be available.

At the conclusion of the design workshops, the user requirements for documentation include:

- Handover information needs to be entered electronically;
- Documentation of user, time and date of all clinical handover messages entered;
- Clinical handover messages must be searchable and displayable through medical units, for current active clinical handover for each patient; and
- Documentation and archiving of all documentation for future audits.

6.3.3 Information

Participants had very different opinions with regards to information requirements. Some participants have indicated their preference for a drop-down list with a detailed documentation of clinical information while other clinicians want free text with minimal information.

The researcher worked together with the participants by encouraging open discussions in order to reach a consensus. The researcher attempted to ensure that all views were taken into account and in instances whereby there was disagreement, the researcher ensured that patient safety was the most important principle which guided discussions in order to reach a consensus among participants in the workshops. It is important to note that as the researcher was not medically trained she acted as a facilitator in the design process and it was ultimately the participants who reached a consensus amongst themselves as to the information requirements.

The researcher in working together with the participants had identified a few important components of information transfer for each individual patient handover. Firstly, participants wanted some data to be retrieved from the current hospital information system. These data included patient name, age, date of birth, URN, the consultant in charge and the medical unit responsible for the long term care of the patient. These basic patient data were deemed

necessary by all participants. Secondly, participants had difficulties in reaching an agreement on the way handover messages should be entered and presented. Some participants indicated their preference for a simple text box while others wanted more detailed information to be presented. In order to reach a consensus, the researcher asked the participants to illustrate their needs using a case scenario. The participants identified that there were some commonalities in the requirements. From this exercise, it became apparent that participants wanted three elements: background information; current tasks/actions and actions to be taken/advice. These three elements were therefore set out as free text boxes for participants to input information about a patient. Thirdly, participants indicated that the electronic tool should also provide some test results which required a link from the current hospital information system. While some participants indicated their wish for radiology images and reports as well as other investigation results, the consensus was that it would complicate things and slow the system down. All participants, however, agreed that pathology results were essential as they were normally ordered and available for all patients during their hospital stay. Different participants however wanted different results to be included. After extensive discussions, a consensus was reached as to which pathology test results should be displayed in the electronic tool.

At the conclusion of the workshops, the user requirements for information include:

- Automatic retrieval from the current hospital information system for patient details;
- Three free text boxes for background information, current tasks/action and future actions and advice; and
- Automatic retrieval from the current hospital information system of some pathology test results.

6.3.4 Prioritisation

Participants expressed the need for some form of prioritisation of patients presented at clinical handover. This issue was again brought up and discussed in the design workshops. There was some discussion as to which patients should be handed over and what criteria should be used in the prioritisation of the patients.

There was debate about how the prioritisation should be done. Some participants indicated that it should be grouped into urgent and non-urgent tasks. Others suggested a categorisation process that was time dependent.

After extensive discussions with the participants, consensus was reached for the categorisation of handover patients. This consensus was reached by the participants working through the scenarios presented. The categorisation is as follows:

- Category 1: Urgent
- Category 2: Non-urgent
- Category 3: For your information

6.3.5 The electronic tool

Participants expressed different opinions and had different expectations of the electronic tool. Some participants indicated that it should be a replacement of current clinical handover processes

while the majority believed that it should only be used as a support tool to complement and support current practice.

Some participants indicated that it should form part of the current DMR but others believed that it would be better off being a stand-alone program. The practicalities of using the scanned DMR was near impossible as the DMR was designed as an archiving tool which did not allow for participants to enter data at that time. Therefore, it was decided that a stand-alone program should be developed.

A number of participants, especially the younger participants expressed their wish to use mobile computing devices, such as tablets PC for clinical handover. This view was not shared by many others as interns generally already carried around a lot of paperwork with them on their ward rounds and the need to carry a mobile computing device would add to their physical load. Therefore, it was decided that an intranet based program would be most useful.

Participants also stressed the need for a good back up and a function allowing for them to print patient lists and handover lists. They then drew up a template indicating how they wanted their information printed on paper. A consensus was reached quickly about what the printed lists should look like and it appeared that it was largely similar to those currently used on the paper based system.

At the end of the workshops, the user requirements for the tool itself include:

- It should support and complement the current clinical handover process.
- A stand-alone program not linked to the current digital medical record.
- Utilisation of current desktops and desk spaces
- It has a good backup system
- It allows clinicians to print patient list and handover lists.

6.4 Issues to consider

The design workshops conducted were primarily used to obtain the functionalities of the electronic tool to be developed for the Department of General Internal Medicine. There were a number of issues to consider in the conduct of those workshops which are presented below.

6.4.1 Participants' expectations in terms of complexity of the electronic tool is affected by their current use of technology and level of seniority

The researcher utilised the workshops to help determine how complex the participants wanted the electronic tool to be. The researcher found that there was significant variation in the level of complexity expected of the electronic tool and this expectation was somewhat related to the participants' current utilisation of technology as well as their seniority level.

Many junior staff indicated that an electronic tool was the way to go with some participants even going on further to suggest mobile technologies like PC tablets or smart phones . Some of the senior staff indicated the need for printed handover sheets so that they could manually jot down

their own notes. Many participants did not agree with the concept of mobile technologies. One participant indicated that given the amount of paper based forms that they had to carry around with them during ward rounds, it would be hard to carry an added item.

Given that there appeared to be a huge variation on the level of technological complexity, the researcher had to engage in further discussions with the participants in regard to what functionalities would be most widely utilised if implemented. It appeared that most participants were already familiar with the use of desktop computers which were available in the hospital. The participants then agreed that a desktop computer which was linked to the hospital's network would be sufficient. A database would have to be created to store the handover information and participants also indicated that pathology results which fed directly into the electronic tool would be a perk to have as well. This was then used as the basis for the design of the electronic tool.

It is important to note that while the views of senior clinicians are highly valued in any healthcare setting, the true end users of the clinical handover system are the junior staff. All the interns and registrars who have participated in the design workshops have experience with using the current available IT infrastructure and systems in the hospital as part of their job. They have argued that a web-based program accessible through available desktop computers within the hospital should be the platform utilised for the electronic tool as minimal training would be required for all participants to utilise the electronic tool. While the suggestions made by some interns on the use of mobile technology is valuable, the participants decided that it would not be appropriate at this time to implement mobile technology. The interns who suggested this also acknowledged that it might be difficult to take the leap from a paper based system to the use of mobile technologies in such a short period of time.

It is therefore important to note that while participants have different opinions in regard to the technological complexity of the tool which should be designed, they managed to reach a consensus in the first iteration.

6.4.2 The expectations of an electronic tool varies amongst individuals

The interns and registrars demonstrated enthusiasm in participating in the design of the electronic tool as well as learning how to use the tool. Consultants on the other hand seemed less excited probably because they will not be needing to use the electronic tool during handover sessions. The researcher conducted further workshops to generate further insights particularly focusing on the end users of the tool. The participants indicated that the interns would be the primary end users of the tool on a regular basis as it would be the most useful to them to have a set structure for the information and tasks that they need to handover. This also assists them in learning how to handover properly. Registrars and consultants believe that their handovers are different and the electronic tool might not be suited to their needs. The consensus was then to purpose build the electronic tool for the interns with the possibility of a new version developed in the future which can accommodate the needs of registrars and consultants. However, to keep the registrars and consultants engaged in the process, some functionalities that were suggested by the participants that assisted in their work and not impacted on the overall goal of the electronic tool were included e.g. a print-out of a list of patients within each medical unit.

The researcher obtained an understanding in Phase Two that the primary end users of the electronic tool would be the interns and this had significant impact on the design of the electronic tool in regard to access, prioritisation of tasks, documentation and information. The information required for clinical handover was especially important as interns mainly focussed on transferring tasks rather than making decisions about patient care. This was not apparent in the interviews conducted in Phase One. In order to keep the other clinicians engaged in the process, small functionalities not impacting on the overall use of the electronic tool was incorporated for them despite the fact that they are not the primary end users of the tool.

6.4.3 Users have difficulties in defining their IT requirements individually

The researcher found that participants struggled in articulating their requirements for the electronic tools. To overcome this problem, the researcher asked the participants to describe their current clinical handover process in detail and asked them how they wanted the current process improved. She was then able to work together with the participants to obtain the requirements for the electronic tool. In addition, the use of case scenarios facilitated discussions with the participants and helped in generating requirements for the electronic tool. It appeared that participants were better able to comment on something that they could physically see rather than an abstract concept. As such, the researcher utilised whiteboard markers and a whiteboard to illustrate what she thought they wanted and the participants could then engage in discussions on refining what was presented. Participants were encouraged to verbalise their views and draw on the whiteboard and a mock up of the electronic tool was then drawn up in Microsoft Word for participant feedback after the workshops.

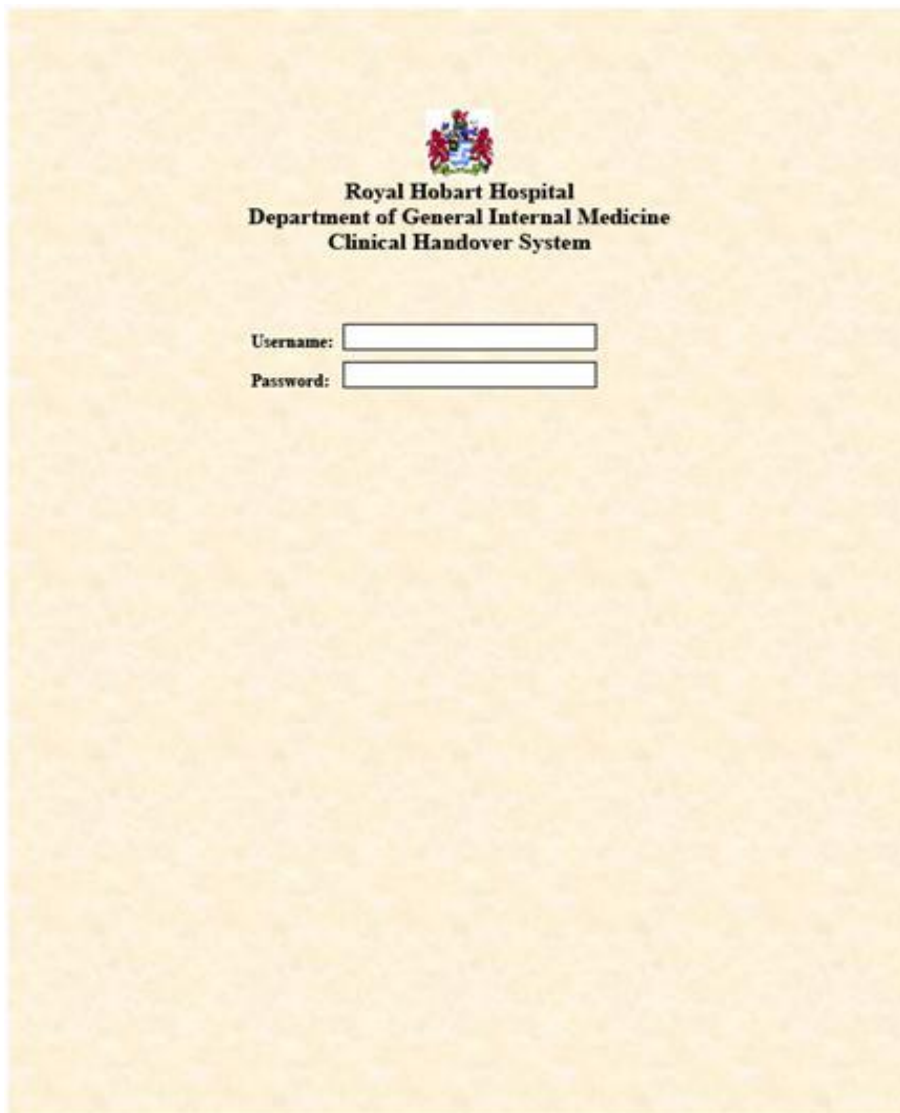
It is important to note that the utilisation of case scenarios and the whiteboard were very useful in engaging the participants in discussions in order to draw out the requirements for the electronic tool. Providing them with clinical scenarios was especially useful in helping them visualise how they wanted the electronic tool to work and reaching a consensus about the functions of the electronic tool on their own. Clinicians have a strong belief that only the themselves know their work and by allowing them to work through the case scenarios and reaching a consensus on their own, the adoption of this user-centred approach was particularly useful in the design workshops.

6.5 Prototype of the electronic clinical handover tool using MSWord

A prototype of the electronic clinical handover tool was developed using Microsoft Word incorporating all the user requirements from the three design workshops. A copy of this prototype was forwarded to all participants involved in the workshops through either their choice of email or a printed copy for feedback. Participants could provide feedback face to face, through emails or write on the printed sheets.

6.5.1 Logging in

Figure 31 shows the proposed first screen the users encounter when they access the electronic clinical handover tool. This page contains the hospital logo and the name of the tool. This was included to illustrate the Royal Hobart Hospital and the Department of General Internal Medicine's endorsement of the electronic clinical handover tool. This page also ensures that access electronic tool is only available to staff working within the Department of General Internal Medicine through a secure login process.



The image shows a log-in screen with a light yellow background. At the top center is the Royal Hobart Hospital crest, which features a shield with various symbols, flanked by two red lions, and topped with a crown. Below the crest, the text "Royal Hobart Hospital" is written in a bold, black, serif font. Underneath that, "Department of General Internal Medicine" is written in a smaller, bold, black, serif font. At the bottom of the text block, "Clinical Handover System" is written in a bold, black, serif font. Below the text, there are two input fields. The first is labeled "Username:" and the second is labeled "Password:". Both labels are in a small, black, sans-serif font. The input fields are white rectangles with thin black borders.

Figure 31: Log-in screen

6.5.2 Patient lists

Figure 32 is the proposed second page of the electronic clinical handover tool. This page serves three functions. Firstly, it allows for the participants to search for a patient in multiple ways – the patient’s unique reference number (URN), first name and/or last name. This enables the rapid retrieval of handover documentation and is particularly useful for participants if they were called about a patient who they were unfamiliar with. They could then use this function to quickly search for handover notes from the home team. Secondly, it allows participants to search for patients according to medical units and display them by location as well as by handover category. The former is useful for participants to print out patient lists for their ward rounds and the latter is useful for participants who are covering someone else’s shift to alert them on what tasks need to be performed on the patient according to the urgency of the tasks.

The screenshot displays the 'Royal Hobart Hospital Department of General Internal Medicine Clinical Handover System' interface. It includes a welcome message 'Welcome Dr XXX' and two main sections: 'Patient Search' and two list viewing options. The 'Patient Search' section has input fields for 'Last Name', 'First Name', and 'URN', each with a corresponding 'Search' button. Below this are two panels: 'View Patient List by Wards' and 'View Patient List by Handover Category'. Both panels list medical units: Med B, Med C, Med E, Med F, Med PU, and All Medical Units.

Royal Hobart Hospital
Department of General Internal Medicine
Clinical Handover System

Welcome Dr XXX

Patient Search

Last Name: URN:

First Name:

View Patient List by Wards

Med B

Med C

Med E

Med F

Med PU

View Patient List by Handover Category

Med B

Med C

Med E


Med F

Med PU

All Medical Units

Figure 32: Patient lists

Figure 33 provides a screen shot of the proposed display of patient lists by wards. This is not technically a requirement to improve clinical handover as a patient list is not strictly part of the clinical handover process. However, the researcher decided to include this function as a means to engage with the clinicians as participants mentioned during the familiarisation workshops and design workshops that they desperately needed a way to print and display their current patient lists which caters to their information needs. This included patient details within a particular medical unit and listed by location in order to facilitate a smoother ward round. Participants also indicated their wish to have pathology results displayed so that they didn't have to go into a separate system to check the pathology results. The researcher identified this as a good opportunity to engage with the participants and at the same time provide them with incentives to use the electronic clinical handover tool. Requests from participants to provide alerts that clinical handover messages had been left for a patient could also prove helpful in improving clinical handover. As such, three columns were created – patient demographics, alert for handover messages and pathology results. The layout of this page was discussed during the design workshops and the participants agreed that this layout would work well in their current work model.



Royal Hobart Hospital
Department of General Internal Medicine
Clinical Handover System

Med << >> Patient List By Ward


<Patient Name> <URN> <Location> <Consultant>	<Alerts>	<Pathology Results>
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Print

Logout

Figure 33: Medical <Unit> Patient List by Ward

Figure 34 provides a proposed screen of patient list by handover category should the participant choose to search for patients with a clinical handover message, either for a particular unit (checking for handover messages in the morning from the night team) or for the entire general medicine unit (checking for handover messages afterhours). The patient list is sorted by handover category ensuring that patients who require urgent attention are displayed first. As above, essential demographic data relating to the patient will be displayed followed by a list of actions required for that patients and pathology results. This page also allows for participants to print out the handover messages as some participants have indicated their preference to have a physical copy of the handover list.



Royal Hobart Hospital
Department of General Internal Medicine
Clinical Handover System

Med << >> Patient List by Handover Category

Category	Patient Details	Actions	Pathology Results
	<Patient Name> <URN> <Location>		

Print

Logout

Figure 34: Medical <Unit> Patient List by Handover Category

6.5.3 Entering clinical handover information

Figure 35 provides a proposed screen of details in regard to the clinical handover message of a particular patient. If a participant wanted to view, enter or edit a clinical handover message for a particular patient, the participant could select a patient from any of the above patient lists and the following page would be displayed. Multiple different versions of this page were presented and discussed with participants at the design workshop and this was the consensus obtained. Patient demographic data would be automatically retrieved from existing hospital information systems. The clinical handover message itself was classified into three free text boxes. The first free text box suggested to participants to document the issues and background of the patient. The second required participants to highlight the current actions requiring attention and the last box reminded participants to provide a management plan for the patient. Finally, a drop down box prompted clinicians to categorise the patient in terms of urgency as discussed in the design workshop.

Royal Hobart Hospital
Department of General Internal Medicine
Clinical Handover System

Patient Details

Initials: Last Name:
Age: Sex:
URN: Location
Medical Unit: Consultant:

Issues View History Add New

Actions View History Add New


Management Plan View History Add New

Category

Save Print Logout

Figure 35: Patient Details

Figure 36 provides a screenshot for participants to indicate that they have completed a task. To improve clinical handover, participants indicated that all entries should include the name of the clinician and be date and time stamped for audit purposes. This page illustrates that when a clinical handover task is entered by a participant, the system records the name, date and time (these details are obtained when participants use their username and password to log on to the system). Similarly, when participants have indicated that they have completed a task, the information will be logged in the system.



Royal Hobart Hospital
Department of General Internal Medicine
Clinical Handover System

Patient Details

Initials:
Age:
URN:
Medical Unit:

Last Name:
Sex:
Location
Consultant:

Issues

View HistoryAdd New

Actions

View HistoryAdd New

25/10/08, 4.37pm, kcyee
Check bloods

Task Completed

NoYes

Management Plan

View HistoryAdd New

Category

SavePrintLogout

Figure 36: Tasks completed

The MSWord version of the prototype was circulated to participants both in hardcopy and electronic format as requested. Participants were invited to provide feedback to the researcher by either making notes on the printed copies or on the electronic format. Participants were given eight weeks to provide their feedback. The researcher reminded the participants at the four week and the six weeks mark to encourage participants to provide feedback and comments. Despite multiple attempts, there was little feedback provided. The researcher then organised a workshop with the participants in the ninth week and also involved in the clinical handover project registrar in a further attempt to obtain feedback on the prototype. Seven participants attended that workshop and the researcher received written feedback from ten further participants.

While there was not a lot of feedback provided, participants who did provide feedback provided very detailed feedback of the prototype. Participants indicated that they would like the following changes to be made to the prototype.

- Colour scheme

Participants commented that the background colour should be more neutral as the current colour scheme made it difficult to read some of the text as the lighting in some of the areas where the computers were located was not ideal. Participants indicated their wish for a better contrast in colours so as to ensure readability.

- Patient admission list over the last 24 hours

There was a lot of excitement over the electronic clinical handover tool, especially regarding the function which allows for the printing of patient lists. Participants believed that a current problem within the hospital might possibly be addressed with the electronic clinical handover tool. Currently, data entry of a patient's admission to the on-take unit is highly dependent on the data being entered into the hospital information systems correctly for the correct medical unit. This is especially important over the weekend and extended holidays as patients who are admitted under the unit which is not on-take, might not be identified and not seen during the ward rounds the next day. As such, participants requested a list of patients who had been admitted under any General Medicine unit within the last 24 hours. This would then be used as a post-take ward round list to ensure that all patients were seen within 24 hours of being admitted.

- A blank column for notes

Participants requested a blank column on the left so that they could make their own notes about the patient when they printed out the patient list.

- Clinical handover page

Participants requested a check box in front of each action so that they could check the box when the action was completed. Participants also requested that each action should be on a separate line with the name of the requesting clinician, date and time followed by the action required rather than have that on a separate line. Participants also requested that under the

box containing patient demographics, there should also be a box containing pathology results for easy reference.

- Change of terminology

The three-part structure of a clinical handover message, i.e. issues, actions and management plan, of handover messages generated a lot of discussion amongst participants. Most participants were supportive of the idea. However, there was disagreement about how each section should be labelled. Some participants preferred the use of “Background history” to “Issues” in the first section. After much discussion and debate, it was agreed that “Issues” be used as not all background history needed to be handed over. The second section “Actions” was agreed by most participants. However, some thought that “Tasks” would be more appropriate. Participants finally agreed on the term “Actions” as that was viewed as a more positive label. There was much debate about the label for the third section. The initial label was to be “Management Plan”. However, participants thought that it might not be appropriate for the home team to dictate the management plan as they were not the ones who made the decision at the time of action. The final consensus was to use the term “Comments” allowing for the home team to provide advice to the management plan of the patient.

After extensive discussions with the participants during the feedback workshops, as well as informal discussions with the clinical handover project registrar and the Head of Department, the researcher then took on board all of these comments and ensured that the revised requirements were incorporated into the web-based prototype.

6.6 The web-based electronic clinical handover tool

After feedback was obtained from the MSWord prototype, the researcher proceeded to develop the web-based electronic clinical handover tool in conjunction with consultation from the IT Manager in DHHS and a local IT Company.

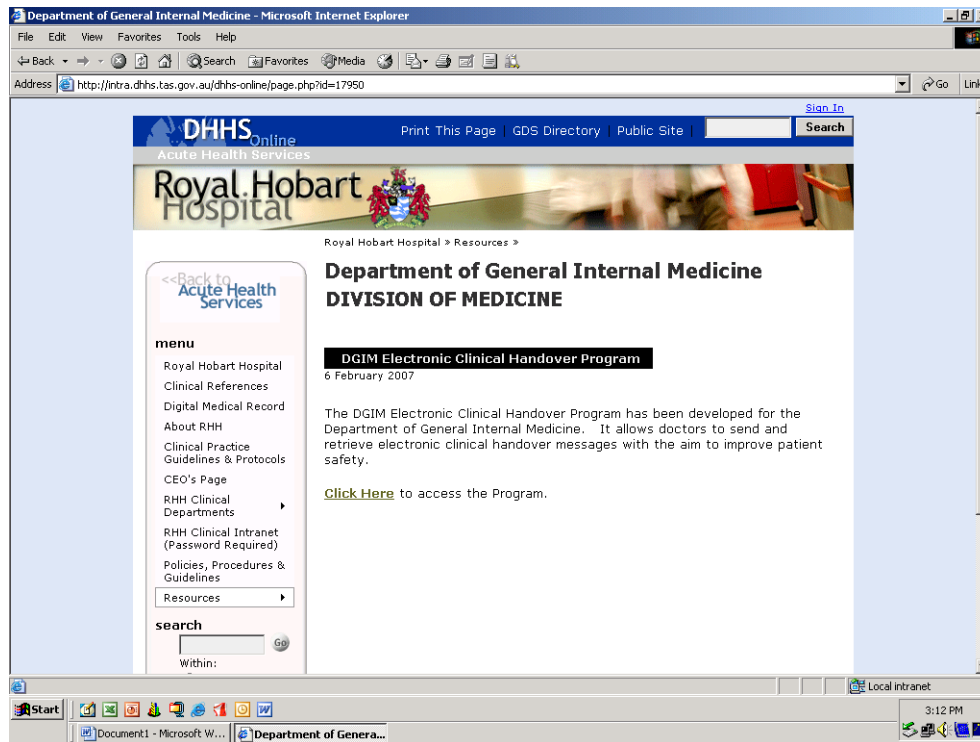


Figure 37: Resource page

Once developed, the electronic clinical handover tool is accessed through the front page of the hospital intranet under Resources (see Figure 37).

6.6.1 Logging in

Access to the electronic clinical handover tool is obtained through logging in with their username and password for information systems access within the hospital intranet (see Figure 38).

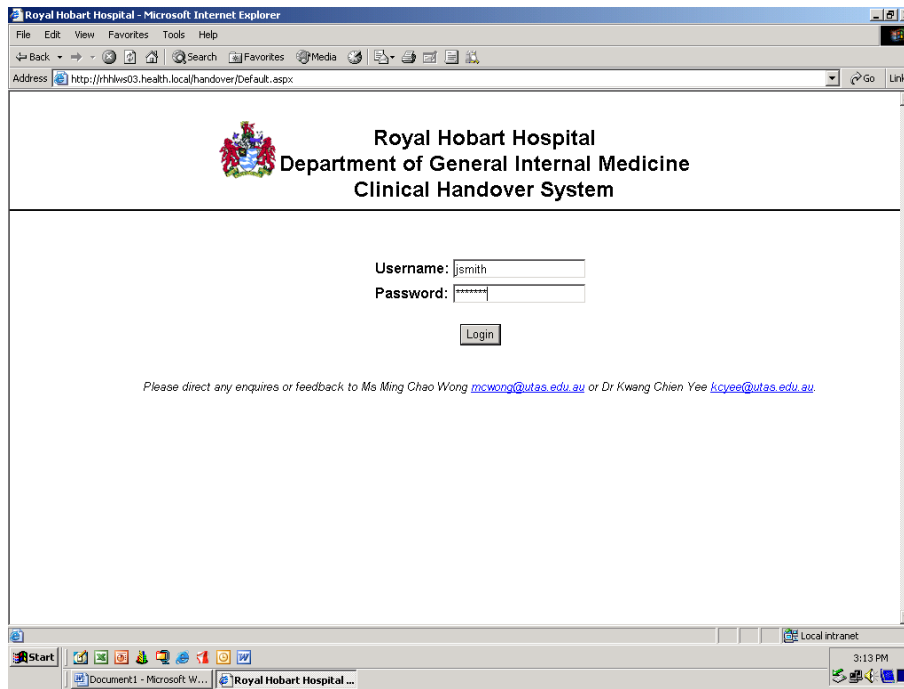


Figure 38: Log in screen

6.6.2 List of patients

This section illustrates how participants can use the electronic tool to view the list of patients that are currently admitted. Participants can choose to either view a full list of the patients by medical units or only those with clinical handover messages associated with them (see Figure 39).

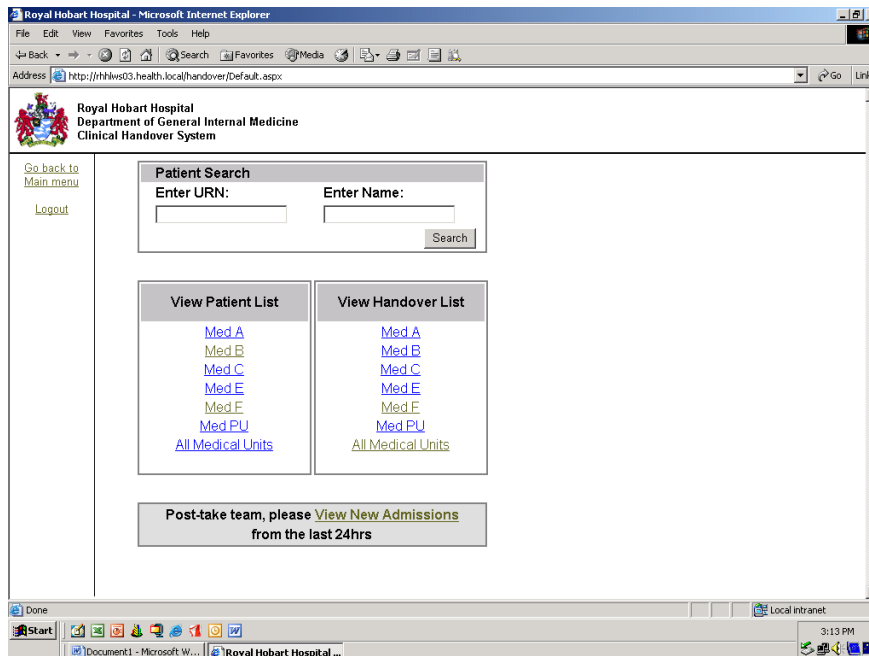


Figure 39: Viewing patient lists and handover lists

6.6.2.1 Viewing patient list by medical units

Participants can choose to view a list of patients under their care by medical units (see Figure 40). This list is useful in the ward rounds conducted in the mornings as it provides each medical unit with the location of the patient, the latest pathology results and indicates if the patient has got any clinical handover messages associated with them.

Admissions over the last 24hrs (Thu, 01 Mar 2007)

H'over Notes	Patient Details	Ward	Consultant	Pathology Results
	XXXXXXX	2BS-S	XXX	Hb 90g/L, Na 140mmol/L, CRP N/A, MCV 97fL, K 4.0mmol/L, INR N/A, WCC 7.43/hL, Urea 5.8mmol/L, D-dimer N/A, Neut 5.4h/L, Creat 89μmol/L, Trop(1 st) N/A, Platelet 263h/L, Ab 19g/L, Trop(2 nd) N/A
	XXXXXXX	2BS-S	XXX	Hb 125g/L, Na 138mmol/L, CRP N/A, MCV 94fL, K 3.4mmol/L, INR N/A, WCC 8.85/hL, Urea 16.1mmol/L, D-dimer N/A, Neut 6.1h/L, Creat 143μmol/L, Trop(1 st) N/A, Platelet 351h/L, Ab 33g/L, Trop(2 nd) N/A
	XXXXXXX	2BS-S	XXX	Hb 118g/L, Na 135mmol/L, CRP N/A, MCV 94fL, K 4.7mmol/L, INR 1.1secs, WCC 8.27/hL, Urea 5.6mmol/L, D-dimer N/A, Neut 4.4h/L, Creat 74μmol/L, Trop(1 st) N/A, Platelet 372h/L, Ab 28g/L, Trop(2 nd) N/A
	XXXXXXX	2BS-SH	XXX	Hb 129g/L, Na 138mmol/L, CRP 62mg/L, MCV 93fL, K 3.7mmol/L, INR 1.4secs, WCC 7.11/hL, Urea 5.1mmol/L, D-dimer N/A, Neut 4.8h/L, Creat 81μmol/L, Trop(1 st) N/A, Platelet 392h/L, Ab N/A, Trop(2 nd) N/A
	XXXXXXX	2DC	XXX	Hb 75g/L, Na 132mmol/L, CRP N/A, MCV 90fL, K 4.4mmol/L, INR 1.0secs, WCC 14.20/hL, Urea 5.9mmol/L, D-dimer N/A, Neut 13.0h/L, Creat 117μmol/L, Trop(1 st) N/A, Platelet 640h/L, Ab N/A, Trop(2 nd) N/A
	XXXXXXX	2DC-SH	XXX	Hb 149g/L, Na 128mmol/L, CRP <5mg/L, MCV 88fL, K 2.9mmol/L, INR N/A, WCC 5.32/hL, Urea 4.0mmol/L, D-dimer N/A, Neut 3.7h/L, Creat 77μmol/L, Trop(1 st) N/A, Platelet 285h/L, Ab 40g/L, Trop(2 nd) N/A
	XXXXXXX	2DC-	XXX	Hb 147g/L, Na 140mmol/L, CRP N/A, MCV 90fL, K 4.0mmol/L, INR N/A

Figure 40: Medical <Unit> Patient List by Ward (NB: Patient information and consultant names have been blanked out in screen shots)

6.6.2.2 Viewing handover list

Participants can also choose to view a list of patients in each medical unit that have clinical handover messages associated with them or view a list of all patients in the department that have clinical handover messages associated with them. This is useful for after-hours care as then participants will have a thorough idea of the patients who need to be attended to who do not belong to their medical unit.

Figure 41 provides a screen shot of a list containing the handover messages. This list is important for the covering team to know what tasks require completion and what other handover messages are available. As requested by the participants, the tasks aka actions requiring completion are displayed in the right column.

Category	Patient Details	Ward	Pathology Results	Actions
2	XXXXXXXX	2BS	Hb N/a Na N/a CRP N/a MCV N/a K N/a INR N/a WCC N/a Urea N/a D-dimer N/a Neut N/a Creat N/a Trop(1 st) N/a Platelet N/a Alb N/a Trop(2 nd) N/a	Action 2 Action 1.1 Action 1

Figure 41: Medical <Unit> Patient List by Handover Category

The 24hr admission list (see Figure 42) is used to facilitate post take ward rounds conducted by the post take team. This is a safety feature of the tool as requested by the participants. The 24hr admission list ensures that all patients admitted under the Department of General Internal Medicine in the last 24hrs appear on this list. The post-take team can then ensure that the patient is being looked after by the correct team. This safety feature was developed based on user insights obtained through Phase One interviews and observation sessions that patients can sometimes be admitted to a unit that was not on-take and therefore risked not being attended to as the patient did not appear on the list for post-take ward rounds. The 24hr admission list is displayed in a way that participants are alerted if there are any handover messages for a particular patient (see Figure 42). Patient details and ward locations are provided as well as the consultant in charge. Selected pathology results as requested by the participants were also provided and a column of writing space is available on the right side to allow for the participants to make personal notes.

Royal Hobart Hospital - Microsoft Internet Explorer

Address: http://hhhlw03.health.local/Handover/Default.aspx

Department of General Internal Medicine
Clinical Handover System

[Go back to Main menu](#)
[Logout](#)

Admissions over the last 24hrs (Thu, 01 Mar 2007)

H'over Notes	Patient Details	Ward	Consultant	Pathology Results
	XXXXXXXX	2BS-S	XXX	Hb 80g/L MCV 97fL WCC 7.43/hL Neut 6.4h/L Platelet 263/hL Na 146mmol/L K 4.0mmol/L Urea 8.8mmol/L Creat 86µmol/L Ab 19g/L CRP N/A INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-S	XXX	Hb 125g/L MCV 94fL WCC 8.85/hL Neut 6.1h/L Platelet 351/hL Na 138mmol/L K 3.4mmol/L Urea 16.1mmol/L Creat 143µmol/L Ab 32g/L CRP N/A INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-S	XXX	Hb 118g/L MCV 94fL WCC 8.27/hL Neut 4.4h/L Platelet 372/hL Na 135mmol/L K 4.7mmol/L Urea 5.6mmol/L Creat 74µmol/L Ab 26g/L CRP N/A INR 1.1secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-SH	XXX	Hb 120g/L MCV 93fL WCC 7.11/hL Neut 4.8h/L Platelet 392/hL Na 138mmol/L K 3.7mmol/L Urea 5.1mmol/L Creat 81µmol/L Ab N/A CRP 62mg/L INR 1.4secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2DC	XXX	Hb 75g/L MCV 90fL WCC 14.30/hL Neut 13.0h/L Platelet 640/hL Na 132mmol/L K 4.4mmol/L Urea 6.9mmol/L Creat 117µmol/L Ab N/A CRP N/A INR 1.0secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2DC-SH	XXX	Hb 140g/L MCV 98fL WCC 5.32/hL Neut 3.7h/L Platelet 285/hL Na 128mmol/L K 2.9mmol/L Urea 4.0mmol/L Creat 77µmol/L Ab 40g/L CRP <5mg/L INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
		2DC-		Hb 147g/L MCV 98fL Na 140mmol/L K 4.0mmol/L CRP N/A INR N/A

Print Back

Done Local intranet 3:27 PM

usermanual.doc - Microso... Royal Hobart Hospital ...

Figure 42: 24hr admission list

6.6.3 Entering clinical handover information

This section illustrates how clinical handover information is entered into the electronic tool. A search function (see Figure 43) is available for participants to search for a patient either by surname, given name or patient identification number when they want to enter clinical handover information about a particular patient. This is also useful when a participant is paged about a particular patient whom he or she is unfamiliar with. The participant is then able to locate the patient information rapidly through this search function.

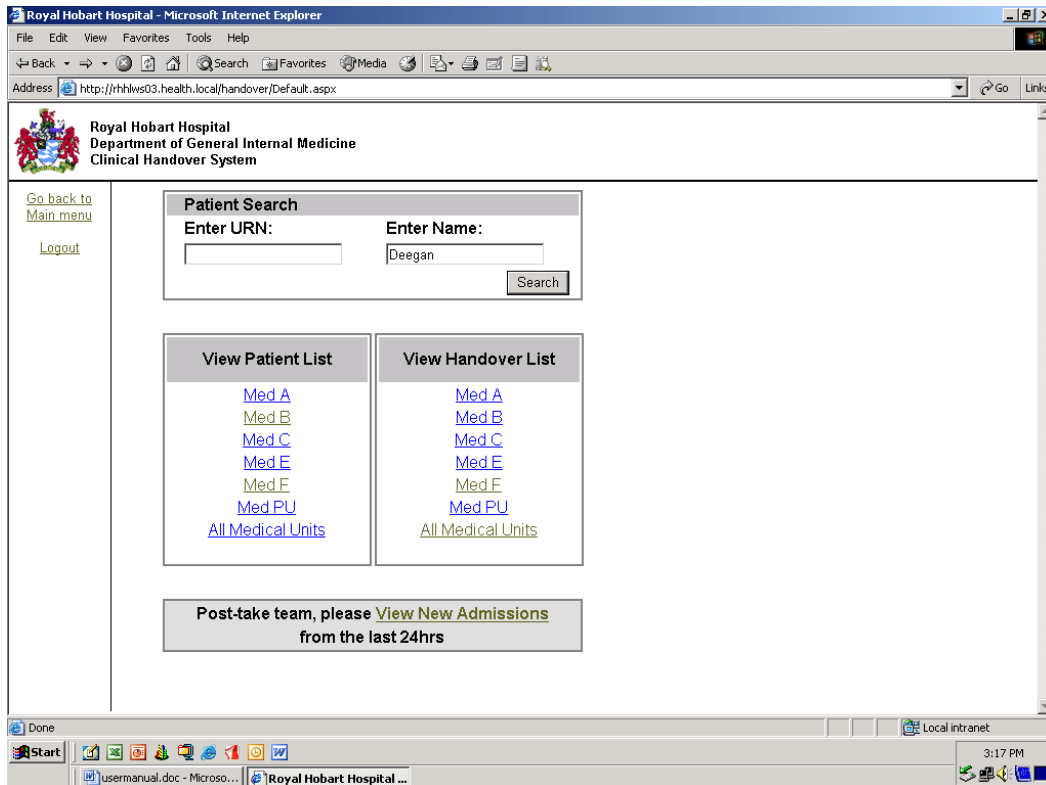


Figure 43: Searching for a patient

Once the patient is selected, the clinical handover page is displayed (see Figure 44). The first section of the page retrieves the information from the hospital information system (HOMER). This includes patient demographics, the unit and consultant in charge of the patient and where the patient is located. The patient's most recent pathology results are displayed in the next section. Multiple changes had to be made in selecting the appropriate pathology results to be displayed as well as the way in which the results are displayed in order to arrive at the final version which is displayed here. This is followed by three free text boxes allowing for the participants to input clinical handover information. All these entries are name, time and date stamped.

Royal Hobart Hospital - Microsoft Internet Explorer

Address: <http://hhlws03.health.local/handover/Default.aspx?PatientId=74528vType=1>

Royal Hobart Hospital
 Department of General Internal Medicine
 Clinical Handover System

[Go back to Main menu](#)
[Logout](#)

Patient Details

Name: URN: Ward: 2BS
 Age: 29 Sex: M
 Medical Unit: F Consultant:

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments Current History

Add New

Issue Details

Search completed, no issue found!

Add New

Actions Completed

Search completed, no action found!

Figure 44: Clinical handover page

In order to ensure that the handover messages are complete, participants are required to enter actions and comments associated with each issue that has been highlighted. Each action and comment must be linked to an issue but each issue can be associated with multiple actions and comments. These linkages were colour coded to enable the participants enhance readability.

This is illustrated in Figure 45 below. There are two issues entered by the participant for this particular patient. The first issue is displayed in the yellow box and the second issue is displayed in the blue box. There are two actions and one comment associated with the first issue and there is one action and one comment associated with the second issue. As the participant entered a new comment, the associated issue that is linked to the comment needs to be selected from a drop down list.

Royal Hobart Hospital - Microsoft Internet Explorer

Address: http://rhhhs03.health.local/Handover/?f=Patient&pId=7452&vType=1&newType=3

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments

Current History

Add New

Issue Details

Issue 2 Enter new comment

Issue 1

Issue:

Issue 2 ...

comment:

Actions

Action 2

Action 1.1

Action 1

Save Cancel

Comments

Comment 2

Comment 1

Category 1

Print Back

Figure 45: Issues, actions and comments

As illustrated in Figure 46, there is a tick box associated with each action to be taken. When a participant has completed an action, the tick box can then be checked to indicate that the action has been completed. When the tick box is checked, the name, time and date is displayed and the participant will be asked to confirm that they have completed the tasks.

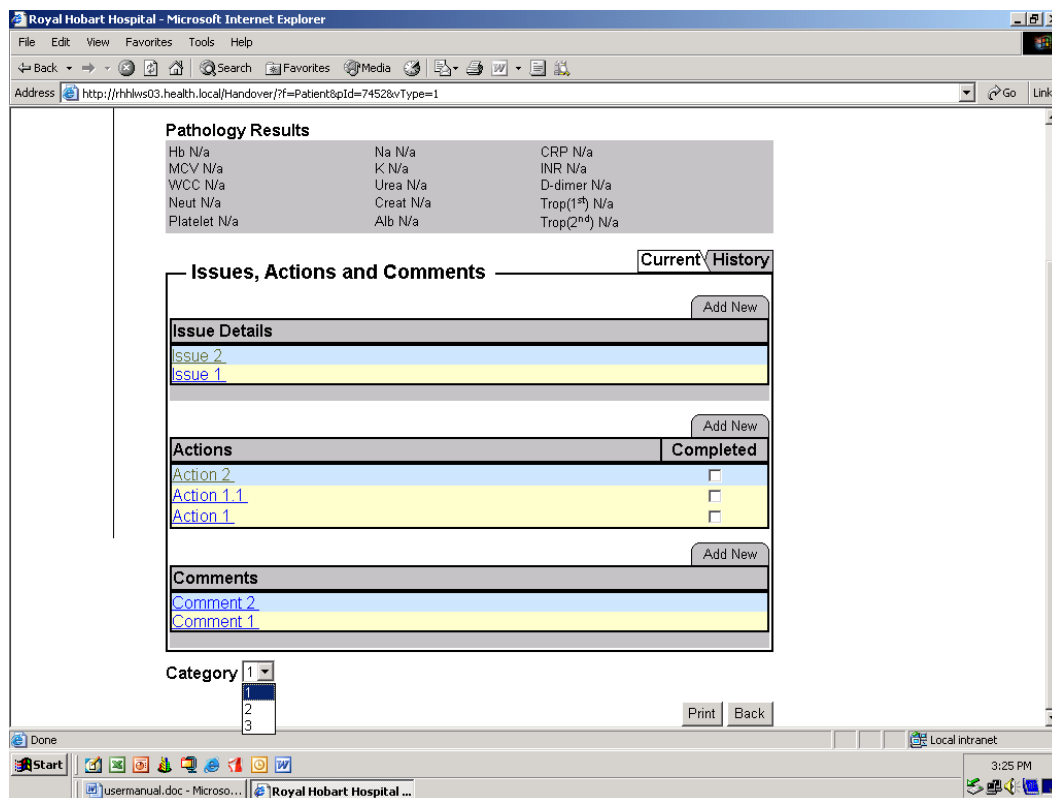


Figure 46: Completed actions

Figure 47 also provides an illustration of the prioritisation function of the electronic tool in accordance with the user requirements obtained through focus groups. The patient is categorised into three categories i.e. Category 1, Category 2 or Category 3 depending on how urgently they need to be attended.

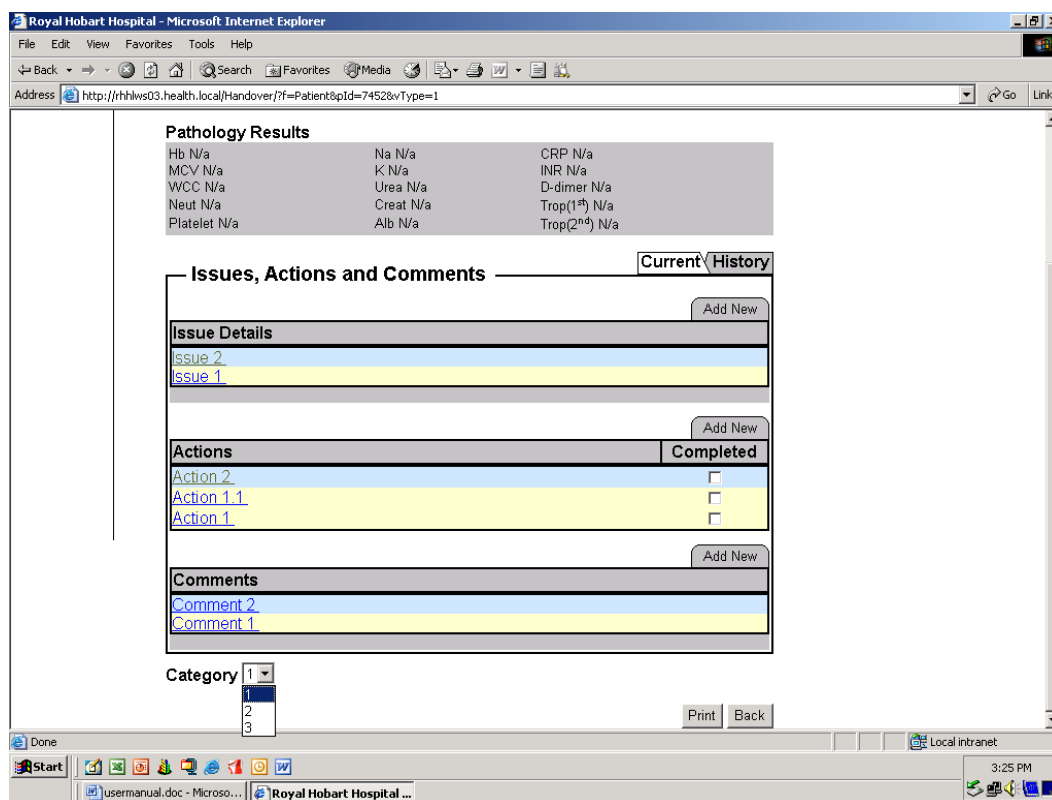


Figure 47: Prioritisation

6.7 Incorporating an education and training program

Insights obtained from the data collected in Phases One and Two strongly suggested that it was important to provide education and training in clinical handover. The researcher therefore engaged in discussions with the clinical handover project registrar and the Head of Department about the possibilities of incorporating an education and training program as part of the introduction of the electronic tool.

The Head of Department and the clinical handover project registrar agreed that the introduction of the electronic tool provided a good opportunity to incorporate an education and training in clinical handover. Therefore, these clinical handover education and training sessions were held in conjunction with education and training sessions on the utilisation of the electronic tool and were held within their normal working hours.

The clinical handover project registrar started these sessions by discussing about clinical handover and the importance of clinical handover. He also suggested ways in which the practice of clinical handover could be improved which formed the background for the education and training of the electronic tool which was conducted by the researcher. Participants were given ample opportunities to trial the electronic tool in order to ensure that they were fully aware of how the electronic tool should be used.

The attendance at these education and training sessions were not compulsory and it was noted that some participants chose not to attend the sessions. In order to ensure that all participants were provided with the information on how to use the electronic tool, a user manual (see

Appendix 5) was developed by the researcher which provided a step-by-step guide for participants in the use of the electronic tool.

6.8 Issues encountered during the development process

The researcher encountered some significant challenges during the development of the electronic clinical handover tool which caused delays in the trialling of the final prototype. Many of these challenges were not identifiable prior to the development of the tool. These are discussed below.

6.8.1 Issues with interoperability and information taxonomy

As HL-7 messaging was the messaging standard used by DHHS, there were some variations in the interpretation of HL-7 guidelines. The electronic clinical handover tool was developed based on the HL-7 platform to receive admission details, patient details and pathology results. When the program was added to the DHHS server, it was unable to retrieve the information required from the hospital information system. In addition, the IT company also encountered significant difficulties in obtaining patient admission data and pathology results correctly, necessitating multiple revisions to the program.

6.8.2 Difficulties in accessing the RHH's IT system and personnel

As the electronic clinical handover tool was developed by a local private company who was not working within DHHS, they had difficulties in accessing DHH's IT system to trial the electronic clinical handover tool before putting the system on live for the clinicians to trial. The delivery of the program required the a programmer to be physically available at the venue to turn on the program and it was difficult to coordinate several people being available at the same time in order to ensure the electronic tool integrates into the existing hospital information system.

6.8.3 Participants requesting changes made post implementation

While the research attempted to capture as much of the user's requirements as possible before the actual development and implementation of the electronic clinical handover tool, participants still requested for changes to be made. For example, participants requested that the column for them to write their notes be changed from the left to the middle of the page. When the changes were made, they found that it did not fit in with their workflow and requested that the column be moved the middle to the right of the page. There were multiple revisions requested with regards to data entry, display of patient details and display of pathology results.

While making the revision itself was not too difficult a task, any changes requiring amendments to the program required re-loading the program again and this was time and resource intensive.

6.8.4 Identification of new workflow issues with the system

After the introduction of the electronic clinical handover tool, the researcher and the participants identified workflow practices which have not been consistent with RHH policies. These workflow practices had significant impact on the proper functioning of the electronic clinical handover tool. An example to illustrate this is the preparation of an admission of a patient by a ward clerk. Whenever a patient is admitted to the hospital and has been accepted by an inpatient team, a request for admission form is submitted and according to hospital policy, this patient should be entered into the hospital information system. Interviews, observations and design workshops conducted did not identify this as a problem as participants indicated that once they had put in an

admission form, the patients would be admitted. This was not a problem when there were empty beds in the hospital but became a problem when there was a bed block in the Department of Emergency Medicine. According to the participants, patients will be admitted under the inpatient team in the Department of Emergency Medicine and the location should be stated as Department of Emergency Medicine in this circumstances. However, in practice, the ward clerk only entered the patient into the hospital information system when there was a bed available in the ward and the patient was about to be transferred to the ward.

While this had minimal impact on patient care in the past with a paper based handover system, this practice had significant impact when the electronic clinical handover tool was used. The patient did not appear on the electronic clinical handover tool as they had not yet been entered into the hospital information system. Participants therefore could not use the electronic clinical handover tool to handover patients who were physically located in the Department of Emergency Medicine and administratively had not been admitted to general medicine unit, despite the fact that these patients had already been medically admitted and was now under the care of the General Medicine team

6.8.5 Inadequate support for the use of technology

The researcher found that there was very poor support for the use of technology at the RHH. While there was a printer in the handover room which allowed the participants to print out patient lists, there was often no paper in the printer or the ink cartridge often took a long time to be changed once it had run out. Prior to the implementation of the electronic clinical handover tool, participants would commonly bring in their own paper or take some paper from the wards to print the patient list.

After the implementation of the electronic clinical handover tool, each unit patient list was 3-5 pages long as there was more information included. Participants often found that there was not enough paper to print the patient list or that the printer had run out of ink. The researcher was unable to identify a maintenance schedule for the printer or identify a source of funding for the purchase of paper and ink cartridges.

This has become an issue which has impacted on the utilisation of the electronic clinical handover tool.

6.9 Chapter reflections

This chapter has provided an overview of the design and development of the electronic tool. The insights obtained from the data collection in Phases One and Two provided the basis for discussions in the design workshops. The prototypes were presented and discussed as to the changes required before the final prototype was agreed upon. Figure 48 provides a summary of steps for the development of the electronic tool. It is anticipated that these steps could be applicable in other user-centred approach environments as long as the key concept of flexible standardisation (Turner et al, 2009) is noted.

A summary of steps in developing the electronic tool

1. Obtain a thorough understanding of the clinical handover process from the users' perspectives through multiple data collection methods.
2. Decide in conjunction with the users if an electronic tool is suitable in their context for clinical handover improvement.
3. Conduct focus groups and design workshops using case scenarios to elicit functional requirements paying attention to who the ultimate end users are and distinguishing primary and secondary users of the electronic tool.
4. Create a simple prototype of the electronic tool for feedback ensuring that changes are responded to and made in a timely manner. (Iterative process)
5. Once the electronic tool is implemented, ensure that any problems that arise after implementation are responded to as quickly as possible.

Figure 48: Summary of steps for electronic tool development

This chapter also discussed the challenges faced by an IS research in the development of an electronic tool in a healthcare setting. While it appeared initially the drawing upon insights obtained through Phases One and Two in the development of an electronic tool was a relatively straightforward task, there were significant challenges that the researcher faced. This was especially so as the researcher was also a facilitator in the entire process. The researcher had no medical background and so it was completely dependent on the participants themselves to work out what they wanted and reach a consensus. The complexities within health care and the heterogeneity of the participants' expectations and IT knowledge proved to be challenges in the development of the electronic tool. Finally, the development of the electronic tool in conjunction with the participants have once again revealed that participants find it hard to articulate what they do and often articulate what they want rather than what they do. As such, rapid revisions were necessary even after the introduction of the electronic tool.

The involvement of the researcher in this phase was really only to act as a facilitator in order to obtain the functional requirements for the electronic tool from the users' perspectives. In doing so, the researcher was also able to obtain a better understanding of clinical handover and clinical handover improvement. Two important findings emerged in this phase of the research.

The first finding is the fact that the use of a user-centred approach in healthcare is complex and needs to take into consideration the hierarchical nature of medical practice. While it was clear before the design of the electronic tool that interns were to be the main users of the electronic tool, the design process not only involved interns but consultants also indicated their wish to be involved in providing input into the design of the electronic tool. Despite the fact that consultants were not going to be the users of the electronic tool, they wanted changes made to the pathology information and to the format and layout of the electronic tool. These changes were made after the electronic tool had already been finalised with the interns and registrars. While consultants are not the primary users of the electronic tool, they were the ones that requested for the information which in turn dictated what the end-users, in this case, the interns may need. Consultants wanted certain information about patients and this dictates what the interns and

registrars would need from the electronic tool to facilitate handover. This is an interesting finding which contributes to key finding 9 discussed in Chapter 9.

The involvement of the researcher in this phase of the research has also allowed for the researcher to better understand the challenges faced in adopting an over-arching user-centred approach in healthcare to improve clinical handover. This is particularly well documented by the workflow issues which appeared only after using the electronic tool in clinical practice. This contributes to key finding 10 which is discussed in Chapter 9.

Chapter 7 will provide an analysis of the data collected in Phase Three after the introduction of the electronic tool.

Chapter 7 Data analysis Phase Three

7.1 Introduction

This chapter presents an analysis of the data from fourteen semi-structured interviews informed by ten observations and a compilation of clinical handover notes conducted in Phase Three with a different cohort of participants.

- Section 7.2 provides a detailed description of the axial codes associated with each core category and the relationships between the axial codes within each core category. The core categories of DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES, and INFORMATION TECHNOLOGY/INFORMATION SYSTEMS (IT/IS) CONSIDERATIONS are discussed with references made to relationships within the axial codes in each of the core categories.
- Section 7.3 provides a description of how the five core categories – DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and IT/IS CONSIDERATIONS relate to one another.
- Section 7.4 provides a summary reflection of the chapter.

7.2 Core categories

This section provides a detailed description of the core categories and their associated axial codes which emerged from the coding process described in Section 3.6. It also highlights the relationships between the axial codes within each core category. The core categories identified are as follows:

- Departmental requirements
- Participant attributes
- Environmental considerations
- Clinical handover experiences
- IT/IS considerations

The following provides a detailed description of the core categories.

7.2.1 Departmental requirements

DEPARTMENTAL REQUIREMENTS was the first core category identified in Phase Three and refers to directions instituted by the Department of General Internal Medicine for clinical handover.

There are four axial codes associated with this core category. These axial codes are defined as follows:

- *POLICIES AND GUIDELINES* refers to a formal direction provided by the Department of General Internal Medicine on the conduct of handover.
- *CLINICIAN ROLES* refers to the functions that each intern, registrar or consultant serves in clinical handover and in patient care.

- *EDUCATION AND TRAINING* refers to the teaching of handover to clinicians.
- *HANDOVER CULTURE* refers to the informal perceptions and practice of clinical handover amongst clinicians in the Department of General Internal Medicine.

Figure 49 provides an illustration of the relationships between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

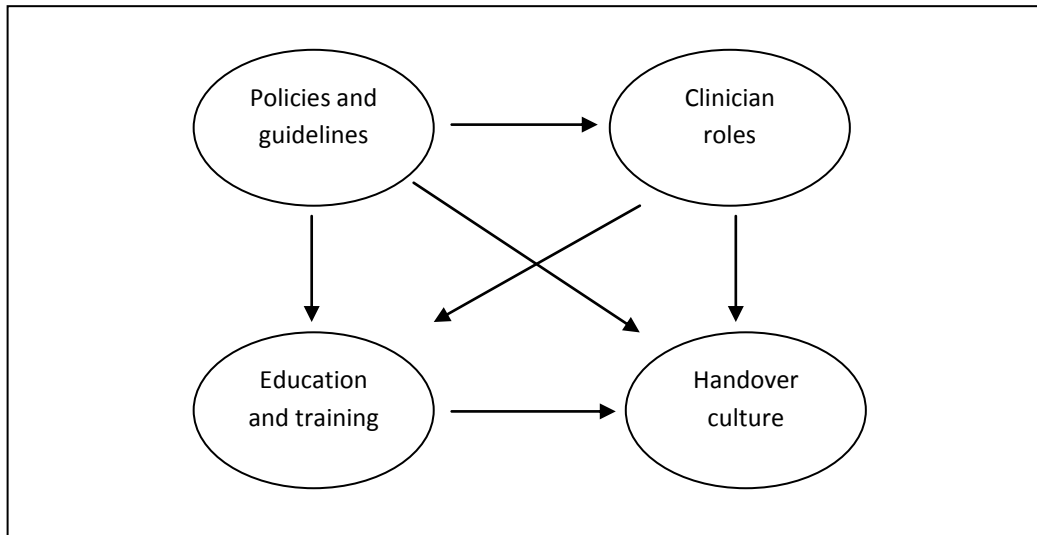


Figure 49: Relationships between axial codes within the core category DEPARTMENTAL REQUIREMENTS.

POLICIES AND GUIDELINES strongly influenced *CLINICIAN ROLES*, *EDUCATION AND TRAINING* and *HANDOVER CULTURE*.

CLINICIAN ROLES strongly influenced *EDUCATION AND TRAINING* and *HANDOVER CULTURE*.

EDUCATION AND TRAINING strongly influenced *HANDOVER CULTURE*.

7.2.1.1 Policies and guidelines

The Department of General Internal Medicine had not revised their clinical handover guidelines since it was introduced in 2005 to incorporate guidelines for the use of the electronic tool. However, a user manual prepared by the researcher was made available to all clinicians in the Department to assist them in the use of the electronic tool (see Appendix 5).

Informal discussions with the Head of Department and the clinical handover project registrar revealed that there were no policies and guidelines governing the use of the electronic tool because the electronic tool was only built as a prototype to support existing clinical handover processes and not as a replacement of the current clinical handover process.

Observations sessions revealed that most participants now adhered to the existing clinical handover guidelines and clinical handover manual during clinical handover sessions. While the use of the electronic tool was not mandatory, most participants did use the tool for clinical handover over the period where the researcher was present. It appeared that the policies and guidelines that had previously been implemented were now working well in general for morning handover. There was a lot more structure in place and participants knew what to expect of the sequence of events. However, afternoon and evening handover sessions still lacked structure.

This observation was supported by interview data. REG R_2007 thought that the policies and guidelines were working well as there were no major problems with clinical handover. It appeared that as participants became more familiar with the clinical handover guidelines and clinical handover manual, they took on a more central role in ensuring that clinical handover sessions occurred.

REG R_2007: *I think the main role is just to one to make sure that there are no problems, I don't see a huge problem at this stage maybe because I think the consultants are used to the idea of them themselves being present, I think that makes a big difference because there is no consultant input in most other hospitals at any clinical handover and I think having the consultants at all means the whole status of the handover process is elevated in the eyes of junior staff.*

REG R_2007's opinion was echoed by REG S_2007. Registrars seemed to take a very active role in ensuring that the clinical handover sessions adhered to the clinical handover guidelines and the clinical handover manual. REG S_2007 indicated that she took on an active role in leading clinical handover and this was confirmed by observation sessions.

REG S_2007: *Morning handover, our role in the morning handover is, I mean as a registrar is to lead the morning handover, umm and to ensure that things are done in an orderly fashion, and that everyone who has been involved in the care of the patient in the past 24 on, umm hours has the opportunity to have their say and let the other people know what has gone on.*

It should be noted that the clinical handover guidelines and clinical handover manual did not always work in all instances. INT E_2007 highlighted the fact that some handover sessions were well structured but others were not. It appeared that while there was an improvement in the utilisation of the clinical handover guidelines and clinical handover manual, there was still room for errors.

INT E_2007: *I think... Handover lacks some structure sometimes, personally I think that. I think that some days we have a great handover. Some days, there will be, you know, by having these three new patients that had been handed over to us. We know they are there, we know all of them, but no one has mentioned anything about them.*

POLICIES AND GUIDELINES strongly influenced **CLINICIAN ROLES**. INT E_2007 articulated his role in handover from both handing over and receiving a handover to ensure the continuity of patient care. INT E_2007 also indicated that interns acted as a gate keeper and that they worked closely with the registrar to maintain continuity of patient care. This was in line with the clinical handover guidelines and clinical handover manual.

INT E_2007: *During the presence of the team, part of the handover, my role in receiving is more of just listen and do that and take notes. In giving is handing over to the evening intern or night intern ... is to make sure that they follow up my patients over the evening or night and they will handback to me the next morning, the relevant information, so that I can then pass on to my registrar to maintain continuity of care for the patients.*

Observation sessions also revealed that interns and registrars were actively involved in clinical handover which was in line with the clinical handover guidelines and clinical handover manual through the utilisation of the electronic tool.

POLICIES AND GUIDELINES strongly influenced *EDUCATION AND TRAINING*. It was observed that the clinical handover guidelines and clinical handover manual that were available provided guidance on how to conduct a handover and this contributed to the education and training of handover.

POLICIES AND GUIDELINES also strongly influenced *HANDOVER CULTURE*. It was found that participants slowly developed a culture of handover as they adhered to the clinical handover guidelines and clinical handover manual.

7.2.1.2 Clinician roles

At an organisation level, clinicians had different roles in patient care depending on their level of seniority. This had not changed since the introduction of the electronic tool. Each participant had a different role in handover because of their different roles in patient care. This was highlighted by INT A_2007 who indicated that they played different roles in handover but emphasised the need to obtain information regarding the management of a patient at an intern's level.

INT A_2007: Handover takes place at every levels, the registrars and interns at both levels so at intern's level we are mostly concerned about the blood tests ah then the parameters of the patient, then handover about um what else, handover about the basic management of the patient and if we have got any problems then we can portray this at anytime but handovers for interns are basically for basic management of the patient.

Interns' saw their role in handover as vital in obtaining an adequate handover in order to manage the patient and ensure the continuity of patient care. INT D_2007 indicated that their role was a gate keeper in managing all the patients and to consult registrars in the event where they needed help.

INT D_2007: It's quite big I would say we probably have the most important role. Ok. Because many things are happening all around and about some of the registrars don't even know sometimes so we have quite a big role there. Um and basically because I would say that we are doing quite a big job during our shift so we must be up-to-date with everything.

CLINICIAN ROLES strongly influenced *EDUCATION AND TRAINING*. It was observed that once the registrars were aware of their role at clinical handover sessions they were more willing to provide the interns with education and training in clinical handover.

CLINICIAN ROLES was influenced by *POLICIES AND GUIDELINES* (see Section 7.2.1.1).

7.2.1.3 Education and training

Formal education and training sessions were provided to the participants as part of the clinical handover improvement process initiated by the Department of General Internal Medicine. The education and training provided included both how to conduct clinical handover and how to utilise the electronic tool.

Observation sessions revealed that the education and training of participants in clinical handover had a positive impact and ensured that there was a smooth handover and followed the agenda put forward by the Department. Some registrars even took on the responsibility of leading the handover sessions as well as educating their juniors about handover. REG S_2007 provided an illustration of this in her interview.

REG S_2007: Morning handover, our role in the morning handover is, I mean as a registrar is to lead the morning handover, umm and to ensure that things are done in an orderly fashion, and that everyone who has been involved in the care of the patient in the past 24 hours has the opportunity to have their say and let the other people know what has gone on. We are also responsible to teach juniors regarding clinical handover.

It should be noted that while extensive training sessions were scheduled and conducted prior to the introduction of the electronic tool, some participants still chose not to attend the education sessions. They did not believe that by not attending the handover education sessions their performance in handover and in using the electronic tool would be compromised. INT S_2007 indicated that her familiarity with the technology equipped her with the ability to utilise the electronic tool without the need for formal education and training.

INT S_2007: I have a feel that and I think I am alright, but it is just... it is ok. I think it is pretty straight forward, and the fact that I could figure out how to use it without actually being told, you know, I don't know, I guess I, like I grown up with computers so, I am reasonably good at, like reasonably familiar with and like using it wasn't too much of a problem.

EDUCATION AND TRAINING strongly influenced HANDOVER CULTURE. Education and training sessions that stressed the importance of clinical handover and introduced techniques to improve handover were observed to have contributed to the development of a culture of clinical handover.

EDUCATION AND TRAINING was influenced by CLINICIAN ROLES (see Section 7.2.1.2).

7.2.1.4 Handover culture

There appeared to be a development of a culture of good handover despite the fact that there were no changes made to the clinical handover guidelines and clinical handover manual.

Observation sessions indicated that after the introduction of the electronic tool, morning handover sessions were mostly well structured and well attended by most participants. There appeared to be either a consultant or someone who was willing to take on the leadership role for morning handover routinely.

Evening handovers were also less organised. However, it was noted that interns were making more of an effort to attend evening handover sessions more regularly with the on-take medical registrar taking on a more active role in leading some of the evening handover sessions.

Night handovers were more organised as compared with Phase One with interns often typing in handover messages in the electronic tool and then sitting down with the night team to conduct a handover. The registrar also took on the leadership role for night handovers.

Observation sessions also revealed that participants, especially the interns and registrars were starting to take handover more seriously. REG M_2007 indicated that there was a culture for registrars to lead handover in the absence of consultants. Observation data confirmed that REG M_2007 and other registrars were starting to take a lead role in night handover as well as some evening handovers after the introduction of the electronic tool.

REG M_2007: *Seems like the registrar's role is to run handover, Depends which handover we are talking about, and obviously there is the morning handover, which the consultants are there to receive the handovers. As well as the registrar, but not always the consultant. And the evening handover, it seems that, we are talking about the 10pm handover. It is the role of the registrar to run, The out-going registrar runs the handover.*

The interns had also developed an expectation that there was to be a formal handover face-to-face with handover information being entered in the electronic tool and a printed copy of the handover notes passed on from one team to the next. INT B_2007 illustrated the handover culture whereby most teams will attend handover sessions face-to-face.

INT B_2007: *Umm, a positive is with handover all teams present, regardless, umm, and that it's usually a fairly clear thing, where we sit down, there is actually a physical handover of notes, umm and there is usually a clear idea of what needs to be done for patients, umm, yeah,*

HANDOVER CULTURE was influenced by POLICIES AND GUIDELINES (see Section 7.2.1.1), CLINICIAN ROLES (see Section 7.2.1.2) and EDUCATION AND TRAINING (see Section 7.2.1.3).

7.2.1.5 Preliminary findings from core category DEPARTMENTAL REQUIREMENTS

Table 16 provides a summary of the unilateral relationships between axial codes in the core category DEPARTMENTAL REQUIREMENTS.

The axial code	Influenced the axial code	Phase Three
Policies and guidelines	Clinician roles	Strong
	Education and training	Strong
	Handover culture	Strong
Clinician roles	Education and training	Strong
	Policies and guidelines	-
	Handover culture	Strong
Education and training	Policies and guidelines	-
	Clinicians roles	-
	Handover culture	Strong
Handover culture	Education and training	-
	Policies and guidelines	-
	Clinician roles	-

Table 16: Summary of relationships between axial codes in core category DEPARTMENTAL REQUIREMENTS

The following presents the preliminary findings from core category DEPARTMENTAL REQUIREMENTS:

- Policies and guidelines heavily dictated the way in which clinical handover was conducted and strongly influenced clinician roles, education and training and in part contributed to developing a handover culture (see Section 7.2.1.1).
- Clinicians had different roles in patient and clinical handover depending on their level of seniority and were now more aware of their roles at clinical handover sessions and this contributed to them being more confident at providing education and training and also contributed in part to developing a handover culture (see Section 7.2.1.2).
- Formal education and training sessions provided on clinical handover and the use of the electronic tool appeared to have in part contributed to the development of a handover

although some participants chose not to attend the education and training sessions (see Section 7.2.1.3).

7.2.2 Participant attributes

PARTICIPANT ATTRIBUTES was the second core category identified in Phase Three and refers to the characteristics of the participants working in the Department of General Internal Medicine who are involved in handover. In this context, participants included interns, registrars and consultants.

There were six axial codes associated with this core category. These axial codes are defined as follows:

- *UNDERSTANDING* refers to the participant's perspective of what clinical handover is and what it should constitute.
- *EXPECTATIONS* refers to the participant's perceptions of what a clinical handover session should encompass.
- *INDIVIDUAL PERSONALITIES* refers to the participant's character and qualities.
- *COMMUNICATION STYLES* refers to how a participant relays or receives clinical handover information.
- *CULTURAL BACKGROUND* refers to the participants' different social, cultural and linguistic backgrounds.
- *BEHAVIOUR* refers to the participant's actions during clinical handover sessions.

Figure 50 provides an illustration of the relationship between axial codes in the core category PARTICIPANT ATTRIBUTES.

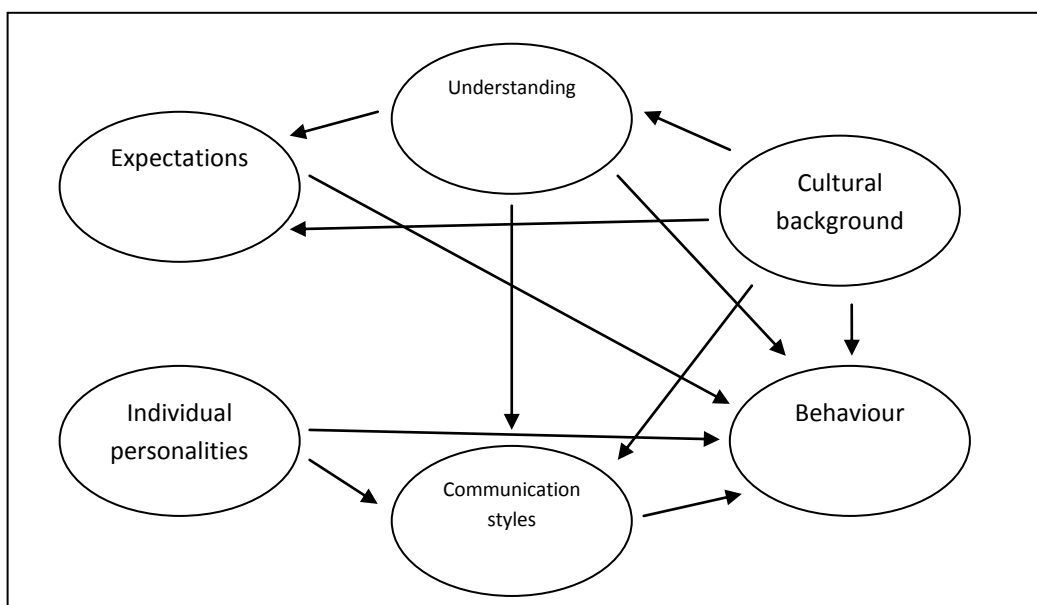


Figure 50: Relationship between axial codes in the core category PARTICIPANT ATTRIBUTES.

UNDERSTANDING strongly influenced *EXPECTATIONS* and moderately influenced *COMMUNICATION STYLES* and *BEHAVIOUR*.

EXPECTATIONS strongly influenced *BEHAVIOUR*.

INDIVIDUAL PERSONALITIES moderately influenced COMMUNICATION STYLES and strongly influenced BEHAVIOUR.

COMMUNICATION STYLES strongly influenced BEHAVIOUR.

CULTURAL BACKGROUND strongly influenced BEHAVIOUR, UNDERSTANDING, EXPECTATIONS AND COMMUNICATION STYLES.

7.2.2.1 Understanding

Many participants especially the interns, appeared to have the understanding that clinical handover is an information transfer process. The purpose of that information transfer process was to ensure continuity of patient care. An example of this understanding was provided by the interview excerpt of Intern A_2007 who indicated that the need to transfer information regarding patient management is done in order to maintain patient care.

INT A_2007: Roughly clinical handover is handing over important information regarding patient management then that management is handed over from one person to the other person. And provide ideas of the patient in order to maintain care.

This view was echoed by Intern S_2007 in her interview who indicated that clinical handover was the transfer of patient care through the transfer of relevant information about the patient. Intern S_2007 however, emphasised the fact that there also needed to be a follow up of the patient.

INT S_2007: Clinical handover is a transfer of information about patients under your care. And you are transferring the care of the patient from one person to someone else. So you need to make sure that they know the relevant information on what you worry about, what you want to have followed up, regarding the people that you are transferring care. I guess

This view was echoed by other participants. For example, INT B_2007 expressed a similar understanding of clinical handover as INT S_2007 and INT A_2007 in regard to information transfer as well as the need to ensure the continuity of patient care. INT B_2007 however went on to explain further that the transfer of information such as what needs to be done in the future and follow up means transfer of clinical responsibility but did not elaborate on how that transfer of clinical responsibility could be achieved.

INT B_2007: Well I would, I mean it's the transfer of not only, I guess, the clinical information regarding patients but also in a sense the clinical responsibilities of those patients as well, so umm, [pause] well, I mean it's function is, you just basically give all the information relevant about their past, and what needs to be done in their future, so it's just purely a transfer of knowledge to maintain a continuation of medical care for the patients, umm, yeah...

The registrars' understanding of clinical handover provided more clarification. It appeared that the responsibility for clinical handover lies between the two parties who are involved in clinical handover at that time. Both the persons handing over and the person at the receiving end have the responsibility to ensure that adequate continuity of care is achieved through an adequate transfer of information. REG M_2007 articulated the need for both parties to ensure an adequate transfer of patient care.

REG M_2007: *So, I guess, you know, there are two people involved in the handover, one person has to give a handover, but it is also your role if you are receiving it to make sure that you get the information that you need. And obviously it is an interactive process*

UNDERSTANDING strongly influenced *EXPECTATIONS*. The general consensus amongst participants was that clinical handover was about ensuring continuity of patient care. This led to an expectation that clinical handover should be about achieving continuity of patient care. This was met by ensuring the handover message received was documented appropriately in regard to tasks required when receiving a handover. In handing over, participants emphasised the need to ensure adequate information as well as a follow up plan was provided.

INT F_2007: *During the presence of the team, part of the handover, my role in receiving is more of just listen, and do that and take notes. In giving is handing over to evening intern or night intern is to make sure that they follow up my patients over the evening or night, and they will handback to me the next morning, the relevant information, so that I can then, pass on to my registrar, to maintain continuity of care for the patients.*

Registrars on the other hand appeared to have developed the understanding that their role was to lead the clinical handover sessions. REG M_2007 indicated that it was a registrars' role to run handover so that all participants, especially the interns had an opportunity to handover patients as well during the handover sessions.

REG M_2007: *It is the role of the registrar to run, The out-going registrar runs the handover. So, they basically give the handover and organise, so getting the interns to give their handovers as well, just co-ordinate that.*

UNDERSTANDING moderately influenced *COMMUNICATION STYLES*. For example, interns understood clinical handover as a transfer of responsibility for task completion. As such, their communication styles focused more on the transfer of tasks rather than a discussion of patient management. Registrars on the other hand focused more on transferring the responsibility for patient management and as such participate in discussions about how a patient should be managed.

UNDERSTANDING moderately influenced *BEHAVIOUR*. It was observed that interns had the understanding that clinical handover was about the transfer of tasks and they often used the electronic tool as the main communication method for standard handover and only highlighted the more complicated cases verbally. Registrars on the other hand had the understanding that clinical handover was about continuity of patient care which required more verbal discussions during clinical handover sessions and so their main communication method was face-to-face meetings supplemented by handwritten notes.

UNDERSTANDING was influenced by *CULTURAL BACKGROUND* (see Section 7.2.2.5).

7.2.2.2 Expectations

As indicated in Section 7.2.2.1, *UNDERSTANDING* strongly influenced *EXPECTATIONS*. *EXPECTATIONS* in turn strongly influenced *BEHAVIOURS*. REG M_2007 emphasised the importance of clinical handover in clinical practice indicating that handover was very important for patient care. His expectation was that clinical handover should be conducted well to ensure good patient care. Observation data supported this relationship between *EXPECTATIONS* and *BEHAVIOUR*. It was observed that REG

M_2007 made it a point to play a lead role in clinical handover to ensure good continuity of patient care. His *BEHAVIOUR* was influenced by his *UNDERSTANDING* and his *EXPECTATIONS* of handover.

REG M_2007: *I think handover is really important. You know, that's important for patient care. My experiences of the handovers are that, I think you need to have a good handover to have good patient care.*

EXPECTATIONS strongly influenced *BEHAVIOUR*. INT A_2007's expectations was that clinical handover should be used to clarify the jobs that has been handed over and in observations have revealed that INT A_2007 makes it a point to ensure that she clearly understand what needs to be done from the intern from the previous shift.

INT A_2007: *You should cross check that the person has understood what you want to do, what they doubt they clarify at the same time of the handover*

EXPECTATIONS was influenced by *UNDERSTANDING* (see Section 7.2.2.1) and *CULTURAL BACKGROUND* (see Section 7.2.2.5).

7.2.2.3 Individual personalities

INDIVIDUAL PERSONALITIES appeared to have less influence on clinical handover after the introduction of the electronic tool. While individual personalities were still at play in clinical handover, it appeared to have a diminished influence on the transfer of information, responsibility and accountability. Observation data revealed that participants entered information into the electronic tool regardless of what information had already been provided face-to-face and that information was used by the receiving team. Participants often printed out the handover information and physically gave that to the next team and highlighted important issues. This minimised the influence that individual personalities had on the process.

INDIVIDUAL PERSONALITIES moderately influenced *COMMUNICATIONS STYLES*. INT S1_2007 communicated very briefly and it was observed that he made very brief comments at handover when he had to. This was supported by an interview excerpt from INT S1_2007 who indicated that all he wanted was straightforward points and he did not really bother much about other issues.

INT S1_2007: *Yeah so um not wasting our time and telling us all this random crap about a patient, like who cares, just get to the point like you can see some guys are so tired they're just reading the sheet they've got in front of them word for word and it's like I don't care mate I don't care just give me relevant positives, relevant negatives so I can get down there*

Interns still considered the personalities of individual consultants as important in affecting clinical handover. The consultant was supposed to act as a leader during the face-to-face handover sessions. As indicated by INT B_2007, the personality of a consultant dictated that particular handover session. If the consultant was known to want a quick and concise handover, then things happened that way. Similarly, if the consultant was known to be more relaxed, then handover happened in a more relaxed manner as well.

INT B_2007: *I think the attitude of the consultant is a big one, umm, some are quite specific about the information that they want and how they want it, some turn up early and say, 'right, let's do it and do it properly, stop talking, pay attention' and then the whole handover is very different to some of the more relaxed one, that like, come in a bit later and the handover's already started and things, and there's been casual handovers between the regs and so, yeah, probably the consultants play a fairly big role in it,*

The *INDIVIDUAL PERSONALITIES* of consultants also affected their *COMMUNICATION STYLES* with the interns and the registrars and this in turn had a strong influence on their *BEHAVIOURS* at clinical handover. INT E_2007 while agreeing with INT B_2007 on the above also pointed out that the consultant's attitude towards junior staff is important as well. This is supported by observation data which indicated that the way the consultant treated the junior clinicians had a significant impact on their behaviour and clinical handover experiences.

INT E_2007: *Umm... the consultant on for the day ... some take it easy and go cruisy and explore most patients in detail during handovers, some wanted three minute handover. Ummm... their attitudes and the consultant's attitudes towards more junior doctors, such as just anyone below them.*

It appeared that it was not only the personalities of a consultant that impacted on clinical handover. The *INDIVIDUAL PERSONALITIES* of the junior staff also impacted on clinical handover. INT S_2007 worried about what tasks would be assessed rather than what needed to be done to achieve the best outcomes. In his interview, INT S1_2007 indicated that he would rather do other things to get through the day than to attend handover. He also checked to ensure that the interview data would not be used to assess his performance prior to saying that. Observation sessions conducted indicated that while INT S1_2007 attended clinical handover, he did not make an effort to participate. Informal discussions with his peers also indicated that he did not put in much effort into his day-to-day work which impacted significantly on clinical handover.

INT S1_2007: *Um I think it is a bit pointless so this is anonymous? I think it is pointless for all the other teams to be involved.*

REG M_2007 on the other hand is a registrar who took pride in what he did. He voluntarily approached the researcher to find out more about the project and expressed his willingness to be involved and to assist in the project. Observation sessions revealed that REG M_2007 played a very active role in clinical handover sessions and also actively encouraged others to take handover seriously. REG M_2007 reflected on his own practice of handover and strived to improve in order to achieve good patient care.

REG M: *Probably one only other comment would be, that umm... I don't think in the past, enough emphasis has been put on handover. And I think you know, we are becoming aware now, that you know that it is just as important to give a good handover, than it is as it is to look after your patient in the best fashion, so you know, good handover is part of a good clinical practice.*

As such, it can be seen that *INDIVIDUAL PERSONALITIES* strongly influenced *BEHAVIOUR*.

7.2.2.4 Communication styles

Different participants communicate differently but the electronic tool had streamlined communication to a certain extent. During the observation sessions, it was found that the

participants used the same headings (issues, actions and comments) provided in the electronic tool in the discussion of their patients during face-to-face handover which was similar to the clinical handover guidelines. The information provided was brief and concise and included some form of prioritisation of the patient. REG R_2007 indicated in his interviews that concise information was required but the information needed to be prioritised.

REG R_2007: I think it should be could be concise so that people aren't loaded down with a whole lot of unnecessary information but certainly have the important information um and yeah I think that's probably the main thing – it needs to be prioritised.

INT A_2007 also indicated that the structured data as introduced via the electronic tool was very important as it helped maintain the usefulness of the handover information.

INT A_2007: in the electronic handover we can categorise or do the grade to the handover thing and um that sort of things are the very important things it will maintain the reliability of the handover.

COMMUNICATION STYLES strongly influenced BEHAVIOUR. Some participants indicated that they wanted concise and succinct information about the patient while others wanted detailed information. As such, those wanting more detailed information would request more information from the outgoing team, while those who wanted concise information would attempt to shorten what was said during handover. The electronic tool moderated the relationship between COMMUNICATION STYLES and BEHAVIOUR as it standardised the information that was transferred.

COMMUNICATION STYLES was influenced by UNDERSTANDING (see Section 7.2.2.1), INDIVIDUAL PERSONALITIES (see Section 7.2.2.3) and CULTURAL BACKGROUND (see Section 7.2.2.5).

7.2.2.5 Cultural background

CULTURAL BACKGROUND influenced many axial codes within this core category. It is important to note that the influence of CULTURAL BACKGROUND affected not only the individual who was providing the handover but also all other participants who were in attendance.

Observation sessions revealed that CULTURAL BACKGROUND strongly influenced BEHAVIOUR. The influence of this however was only obvious for face-to-face handover. Participants of different cultural backgrounds appeared to utilise the electronic tool the same way. Despite the fact that observation sessions revealed that CULTURAL BACKGROUND was important, very few participants actually brought this up in the interviews. In fact, only one participant highlighted the influence of CULTURAL BACKGROUND on clinical handover.

REG G_2007: Yep, like what I was just saying communication skills I think sometimes maybe a cultural thing but I think that's just being unfamiliar with the system

CULTURAL BACKGROUND strongly influenced UNDERSTANDING. It appeared that participants from certain cultural backgrounds viewed handover as being highly important in ensuring the continuity of care while participants from other cultural background did not view handover as such an important event and saw it only as a time to transfer information.

CULTURAL BACKGROUND strongly influenced *EXPECTATIONS*. Participants from some cultural backgrounds expected a clear handover and clear delegation of responsibility. Participants from other backgrounds however expected little during handover and they did not seem to trust the information that had been handed over to them. It was also observed that the cultural background of the outgoing senior clinician affected the expectations from the incoming team considerably. When some participants from certain cultural backgrounds presented at handover, other team members only expected a list of names to be given rather than detailed information.

CULTURAL BACKGROUND strongly influenced *COMMUNICATION STYLES*. This was especially so when it was observed that participants changed their way of communication when presenting to participants of a different cultural background (e.g. they would use a different tone or try to simplify the presentation).

CULTURAL BACKGROUND strongly influenced *BEHAVIOUR*. It was apparent during observation sessions that when participants from a certain cultural background discussed and presented cases, the rest of the participants in the handover room did not pay any attention or were involved in other tasks. On the other hand, when participants from another cultural background took over, the whole team started paying attention.

7.2.2.6 Behaviour

There was a higher degree of complexity in the relationship between *BEHAVIOUR*, *UNDERSTANDING*, *EXPECTATIONS*, *INDIVIDUAL PERSONALITIES* and *CULTURAL BACKGROUND* after the introduction of the electronic tool. *BEHAVIOUR* was influenced by *UNDERSTANDING* (see Section 7.2.2.1) and *EXPECTATIONS* (see Section 7.2.2.2). This influence was also made more complicated by not only the participants' understanding of clinical handover but also their understanding of the electronic tool. It also appeared that the behaviour of senior clinicians had the greatest influence on the behaviour of junior clinicians.

BEHAVIOUR was also influenced by *CULTURAL BACKGROUND* (see Section 7.2.2.5) and *COMMUNICATION STYLES* (see Section 7.2.2.4) but the influence was diminished as participants were now able to use the electronic tool as an additional medium for information transfer.

7.2.2.7 Preliminary findings from core category PARTICIPANT ATTRIBUTES

Table 17 provides a summary of the unilateral relationships between axial codes in the core category PARTICIPANT ATTRIBUTES.

The axial code	Influenced the axial code	Phase Three
Understanding	Expectations	Strong
	Individual personalities	-
	Communication styles	Moderate
	Cultural background	-
	Behaviour	Moderate
Expectations	Individual personalities	-
	Communication styles	-
	Cultural background	-
	Behaviour	Strong
	Understanding	-
Individual personalities	Communication styles	Moderate
	Cultural background	-
	Behaviour	Strong
	Understanding	-
	Expectations	-
Communication styles	Cultural background	-
	Behaviour	Strong
	Understanding	-
	Expectations	-
	Individual personalities	-
Cultural background	Behaviour	Strong
	Understanding	Strong
	Expectations	Strong
	Individual personalities	-
	Communication styles	Strong
Behaviour	Understanding	-
	Expectations	-
	Individual personalities	-
	Communication styles	-
	Cultural background	-

Table 17: Summary of relationships between axial codes in core category PARTICIPANT ATTRIBUTES

The following presents the preliminary findings from core category PARTICIPANT ATTRIBUTES:

1. The participants' understanding of clinical handover had shifted from purely information transfer to ensuring continuity of patient care. This had then changed their expectations, communication styles and behavior at clinical handover (see Section 7.2.2.1).
2. The electronic tool appeared to have assisted in streamlining communication styles to a certain extent with the introduction of presenting the information required under issues, actions and comments (see Section 7.2.2.4).
3. Cultural background continued to be a very important element in clinical handover influencing behavior, understanding, expectations, and communications styles (see Section 7.2.2.5).

7.2.3 Environmental considerations

ENVIRONMENTAL CONSIDERATIONS was the third core category identified in Phase Three and refers to the environment in which clinical handover is being conducted as well as environmental factors which impact on clinical handover.

There were five axial codes associated with this core category. These axial codes are defined as follows:

- *WORKLOAD* refers to the amount of work that a participant has to complete within their shift.
- *VENUE* refers to the physical location in which clinical handover is conducted
- *DISTRACTIONS* refers to anything that diverts the participant's attention during handover
- *IT INFRASTRUCTURE AND SUPPORT* refers to the current available IT infrastructure to support clinical handover.
- *TEAM DYNAMICS* refers to how the interns, registrars and consultants work together as a team to provide patient care.

Figure 51 provides an illustration of the relationships between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

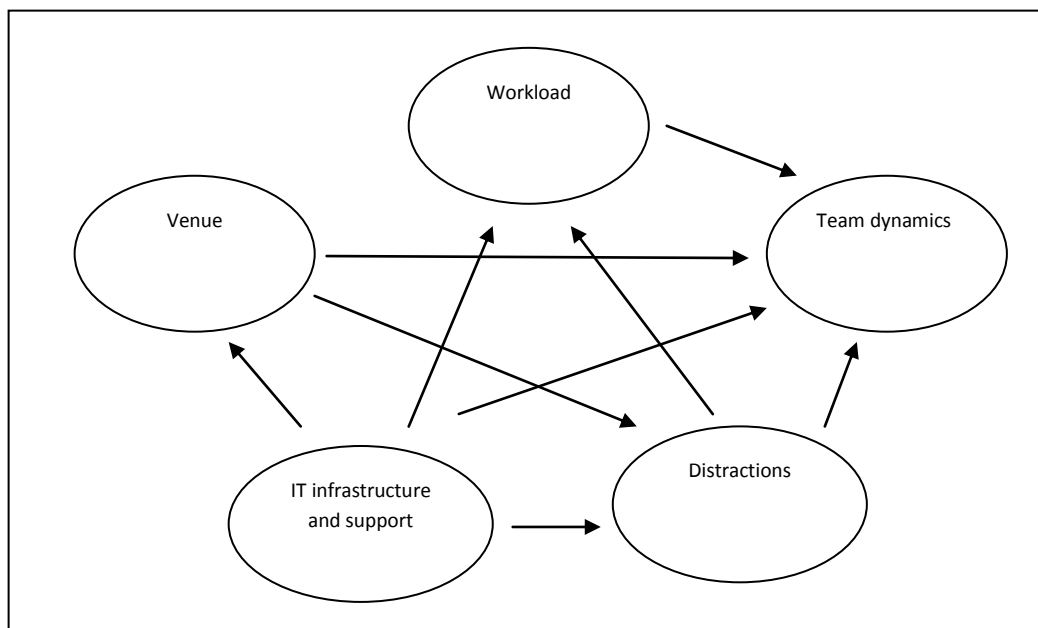


Figure 51: Relationships between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

WORKLOAD moderately influenced *TEAM DYNAMICS*.

VENUE strongly influenced *DISTRACTIONS* and *TEAM DYNAMICS*.

DISTRACTIONS strongly influenced *WORKLOAD* and *TEAM DYNAMICS*.

IT INFRASTRUCTURE AND SUPPORT strongly influenced *WORKLOAD*, *VENUE*, *DISTRACTIONS* and *TEAM DYNAMICS*.

7.2.3.1 Workload

WORKLOAD continued to have a significant influence on clinical handover and the influence of workload was increased as the relationship became more complex after the introduction of the electronic tool. It is important to note that the electronic tool had added to the participants' workload significantly. Firstly, the electronic tool required that interns to spend a considerable amount of time entering the information required for handover and also signing off upon the completion of tasks. Observation sessions revealed that participants spent an average of about thirty minutes prior to clinical handover entering information into the electronic tool.

The impact of a heavier workload on the participants had become more evident after the introduction of the electronic tool. Some participants had been observed to stay beyond their actual working hours to input data into the electronic tool if they had a busy shift to ensure that all relevant information was available electronically to support their verbal handover. REG M_2007 highlighted that workload did impact on clinical handover as it meant that sometimes participants had to stay late in order to input information into the electronic tool.

REG M_2007: Time, hmm... umm... clinical load.... How busy you are. I guess with time, go whether you are happy to stay late or not.... so time, load, They are probably your only two things. You know, It is never an issue of whether or not you want to give a good handover. It is limited by those two things

It had also been highlighted by INT D_2007 that the electronic tool required participants to spend more time during handover to input the data. Participants not only need to use the electronic tool but also attend verbal face-to-face handover sessions. However, it appeared that over time, it became less time consuming to enter the data into the electronic tool.

INT D_2007: Of course there is time has it's pros and cons because it is very time consuming I must say at the beginning when I have tried to do it it takes quite a lot of time but anyway it's a really good idea. And that is why I actually think people are not doing it at the moment because it is really time consuming and you do the verbal handover so people probably think there is no point to write it down again

WORKLOAD moderately influenced TEAM DYNAMICS. If the team was faced with a heavy workload, aspects of handover might be affected as they were not able to remember the whole event.

INT E_2007: Umm... the occurrences that may occur overnight. If doctors are flat-chat overnight, they get to be there in the morning and they are exhausted and sometimes they can forget things when that happens.

INT S_2007 indicated that the quality of the handover was better with a lighter workload as the number of patients seen affects clinical handover.

INT S_2007: The sort of environment that you are doing it in ... the quality of a handover is going to be better if you don't have as many patients overnight. You know, if you have seen 10, then you are not going to go into as much detail and not going to have done a, probably, possibly not going to have done as good a job in admitting them, if you have only done 2, so I guess, the workload would affect it. ...

If the outgoing team had a heavy workload and the incoming team realised the amount of work that they were going to be faced with, they were less likely to be interested in obtaining a full handover as they were more keen to get on with their jobs. This was clearly demonstrated by INT

A_2007 who indicated that the number of patients affected her concentration on each patient at handover and therefore she might miss certain details.

INT A_2007: *Ok work load means if you have got many patients then you cannot concentrate the same on each patient so you might miss things during handover,*

INT S_2007 indicated that if the outgoing team had a very heavy workload, they might not handover adequately at all due to the fact that they just wanted to get home and could not be bothered.

INT S_2007: *if you only get one handover they're more inclined to give you a much more thorough handover where as if they've been worked like a dog, they're completely shagged and they can't be bothered and they give you this kind of runny version.*

It was also observed that if participants had to be called away for an emergency during handover time, the incoming team could then look at the handover notes on the electronic tool and this meant that if some participants had to be called away, there was less impact on the clinical handover session itself. If the participants came back within a reasonable time frame, face-to-face handover was then used to clarify important issues which have already been entered into the clinical handover support tool.

Observation sessions also revealed that after a busy shift, participants handed over important and urgent tasks to the next team and told them that they would enter the routine and less urgent tasks into the electronic tool so that the incoming team did not have to spend so much time on the full handover and get on with their tasks.

WORKLOAD was influenced by DISTRACTIONS (see Section 7.2.3.3).

7.2.3.2 Venue

Observation sessions revealed that after the introduction of the electronic tool, clinical handover now only occurred in the designated clinical handover room. During the morning handover, participants would sit around the table and the handover information was projected on a large screen. While the current set up meant that there were quite a lot of distractions and participants were not able to fully maximise the use of the tool, it did not appear to bother them. REG M_2007 indicated that it was important for everyone to sit down in the morning to ensure that a good handover was conducted.

REG M_2007: *Sure, I'll just have a think. The good point is that we are all able to sit together and do the handover in the morning and I think pretty much from the time I have been here I've not missed out on any patients with any problems so far yes and it doesn't go too long so it is perfectly timed,*

During evening and night handovers, often up to five participants gathered around the computers and printer during handover.

VENUE strongly influenced DISTRACTIONS. While the observation sessions suggested that the venue chosen had multiple distractions, participants did not highlight these in their interviews.

VENUE strongly influenced TEAM DYNAMICS. Firstly, participants who arrived late for clinical now caused disruptions as handover information was now projected onto a screen at the front of the

room. Secondly, the location of the computers and the printer meant that if the information was not projected, it was almost impossible for all participants to view the information. INT D_2007 had indicated that the use of the projector would make the use of the electronic tool more efficient.

INT D_2007: Ah Well as I said it's all basically the same venue, it would be more efficient if first of all we had our time to come here. I think like would be more efficient to continue with electronic handover if people were using the projector and so on.

Handover seemed to be better if two teams had an opportunity to sit down and handover to each other. A designated location which allowed the two teams to sit down together for handover appeared to be the requirement for good team dynamics to occur for good handover.

REG M_2007: The good point is that we are all able to sit together and do the handover...

VENUE was influenced by IT INFRASTRUCTURE AND SUPPORT (see Section 7.2.3.4).

7.2.3.3 Distractions

Observation sessions revealed that there were internal (within a participant's control) and external (beyond a participant's control) distractions. After the introduction of the electronic tool, internal distractions also included the utilisation of the electronic tool during handover. It was also noted that participants were no longer having breakfast during morning handover.

There appeared to be less external distractions as handover occurred mostly in the handover room. Evening and night handovers occurred mostly in front of the computers in the handover room. This in turn led to there being less external distractions from the presence of other medical officers not involved in handover and other activities like watching television. However, participants still encountered the problem of being paged while they were in the process of handing over. As such, DISTRACTIONS increased WORKLOAD as they needed to return to the computer to type in handover notes.

Participants were still particularly annoyed by external distractions, especially interruptions from other healthcare professionals (eg. nurses paging). As described by Intern S_2007, her ideal handover would be one with no external distractions particularly pagers going off.

INT S_2007: An ideal handover would involve, umm... I guess, you have all the things, you have, you have some where quiet, with sort of ... no distractions, there will be no pagers going off.

The chosen handover venue however did offer many distractions. The location of the handover room beside a main road meant that there was a lot of loud traffic noise and this was unavoidable even with the windows closed. The computers and the printer in the handover room also caused some distraction as some participants were printing patient lists while handover was happening.

INT B_2007: [pause] umm, I don't know, I guess just handovers that are clear and quick and keep your attention focussed, I guess would be nice, as I said that doesn't always happen because of other reason, I mean there's a lot of street noise, even from up here, less background distractions.

DISTRACTIONS influenced *TEAM DYNAMICS* in two ways. It was observed that when there were noise distractions, the teams involved were asked to do a quick handover as they could not hear properly. Also, if someone in the team was paged and went off to answer the page, it affected the team working together towards a better handover as some team members were not present.

DISTRACTIONS was influenced by *VENUE* (see Section 7.2.3.2), and *IT INFRASTRUCTURE AND SUPPORT* (see Section 7.2.3.4)

7.2.3.4 IT infrastructure and support

IT INFRASTRUCTURE AND SUPPORT became an important part of *ENVIRONMENTAL CONSIDERATIONS* after the introduction of the electronic tool. There were three working computers in the handover room which appeared to be sufficient to cater to the participants' needs most of the time other than morning handover when there were a lot more participants involved. Observation sessions revealed that participants often arrived earlier than the stipulated handover time to input the clinical handover information into the electronic tool. Informal discussions with participants found that there were insufficient computers and insufficient desk space on the wards to allow the participants to input the information near the patient's point of care. The participants often had to rely on their memory or brief notes that they took at the point of care when they entered in the handover information in the handover room.

IT INFRASTRUCTURE AND SUPPORT strongly influenced *WORKLOAD*. Observation sessions revealed that some participants did stay back after their shift to enter the handover information into the electronic tool to ensure that the information was properly documented and available should the next shift require it. Informal discussions with the participants indicated that the lack of adequate IT infrastructure on the wards was the main reason that they had to stay late.

IT INFRASTRUCTURE AND SUPPORT strongly influenced *VENUE*. As the computers were only available in the handover room, clinical handover occurred mostly in the handover room for morning, evening and night handovers. Evening and night handovers commonly occurred in the corner where the computers were placed.

The relationship between *IT INFRASTRUCTURE AND SUPPORT* and *DISTRACTIONS* was complex. The IT infrastructure (or lack of) could be a cause of distraction. Observation sessions revealed that at times, the printer did not work as it should due to poor maintenance and it was unclear as to who should be contacted when these issues arose. Participants who arrived for handover would then leave the handover session in search for another printer to print out their patient lists and handover lists. This resulted in either the participants coming in late for the handover or them missing out on parts of the handover. Distractions also impacted on the utilisation of the computers. Informal discussions with the participants indicated that if they were seen trying to enter clinical handover information on the electronic tool, they were assumed to have some free time on their hands and were asked to complete other clinical tasks.

IT INFRASTRUCTURE strongly influenced *TEAM DYNAMICS*. While participants did express this in the interviews, it was observed that when the projector was used in handover, both the outgoing and the incoming teams focused their attention on the projector screen rather than one another. Also, during evening and night handover, the two teams commonly sat in front of the computer

during handover and looked at the screen rather than at each other. If the *IT INFRASTRUCTURE* did not meet the team's functions, one team member usually would leave to get the problem sorted and this had a significant impact on *TEAM DYNAMICS* at clinical handover.

7.2.3.5 Team dynamics

Analysis of the data revealed that two aspects of team dynamics were important after the introduction of the electronic tool. Firstly, the teams involved in handover needed to work together to achieve the common goal of continuity of patient care. Secondly, team members working within the same medical team needed to work together to achieve the best handover.

TEAM DYNAMICS focused on the relationships between two or more participants. This relationship was important as it impacted on how clinical handover was conducted and also how well clinical handover was conducted. As described by INT S_2007, the relationship between the participants and therefore *TEAM DYNAMICS* significantly impacted on handover.

INT S_2007: the... the... kind of the ... like the relationship between the two people who are handing over, you know, how formal it is and how comfortable you feel about the person that you are handing over to.

REG A_2007 explained that the two parties in handover tended to have different levels of clinical experience, expertise and commitment to the care of the patients. Varying levels of seniority amongst participants not only dictated the way handover was conducted but also dictated how efficient and effective handover is.

REG A_2007: and another thing which I think will, the importance of problems, you know, priority, in effect, obviously the two parties involved in the handover would have a big influence, depending on their previous experience, expertise, and commitment, so the handover between two interns would be very different to a handover between two more senior medical staff, I would think, that's an important thing,

TEAM DYNAMICS was influenced by *WORKLOAD* (see Section 7.2.3.1), *VENUE* (see Section 7.2.3.2), *DISTRACTIONS* (see Section 7.2.3.3) and *IT INFRASTRUCTURE AND SUPPORT* (see Section 7.2.3.4).

7.2.3.6 Preliminary findings from core category ENVIRONMENTAL CONSIDERATIONS

Table 18 provides a summary of the unilateral relationships between axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

The axial code	Influenced the axial code	Phase Three
Workload	Venue	-
	Distractions	-
	Number of participants	-
	Team dynamics	Moderate
	IT infrastructure and support	-
Venue	Distractions	Strong
	Number of participants	-
	Team dynamics	Strong
	Workload	-
	IT infrastructure and support	Strong
Distractions	Number of participants	-
	Team dynamics	Strong
	Workload	Strong
	Venue	-
	IT infrastructure and support	-
Number of participants	Team dynamics	-
	Workload	-
	Venue	-
	Distractions	-
	IT infrastructure and support	-
Team dynamics	Workload	-
	Venue	-
	Distractions	-
	Infrastructure and support	-
	Number of participants	-
IT infrastructure and support	Workload	Strong
	Venue	Strong
	Distractions	Strong
	Number of participants	-
	Team dynamics	Strong

Table 18: Summary of relationships between axial codes in core category ENVIRONMENTAL CONSIDERATIONS

The following presents the preliminary findings from core category ENVIRONMENTAL CONSIDERATIONS:

- Workload continued to have a significant influence on clinical handover as the introduction of the electronic tool had actually added to the interns' workload. However, there was more room for workarounds if the participants really could not attend face-to-face clinical handover sessions (see Section 7.2.3.1).
- Clinical handover now only occurred in the designated clinical handover room as it had the computers and printer and an overhead projector to facilitate the use of the electronic tool (see Section 7.2.3.2).
- Utilisation of the electronic tool contributed to being a source of distraction at clinical handover sessions (see Section 7.2.3.3).

- Adequate IT infrastructure and support was vital in ensuring the sustainable use of the electronic tool (see Section 7.2.3.4).
- Team dynamics was extremely important in clinical handover sessions and was influenced by a participant's workload, venue, distractions and the IT infrastructure and support available (see Section 7.2.3.5).

7.2.4 Clinical handover experiences

CLINICAL HANDOVER EXPERIENCES was the fourth core category identified in Phase Three and refers to the participant's practical experiences of being involved in clinical handover at the Department of General Internal Medicine.

There were six axial codes associated with this core category. These axial codes are defined as follows:

- *ATTENDANCE* refers to the participant's physical presence at clinical handover.
- *SUPPORT* refers to clinical handover sessions being used as a means for personal well-being and professional development.
- *EDUCATIONAL COMPONENT* refers to clinical handover sessions being used to provide education and training in patient care for the participants.
- *STRUCTURE* refers to the format of the clinical handover session. This includes the order of proceedings and agenda during a clinical handover session.
- *INFORMATION TRANSFER* refers to the process of passing information from one person to another or one team to another. It also refers to the content of information that is passed on.
- *CLINICAL HANDOVER OUTCOMES* refers to whether the clinical handover process has delivered on the pre-designated goals and aims.

Figure 52 provides an illustration of the relationships between axial codes in the core category CLINICAL HANDOVER EXPERIENCES.

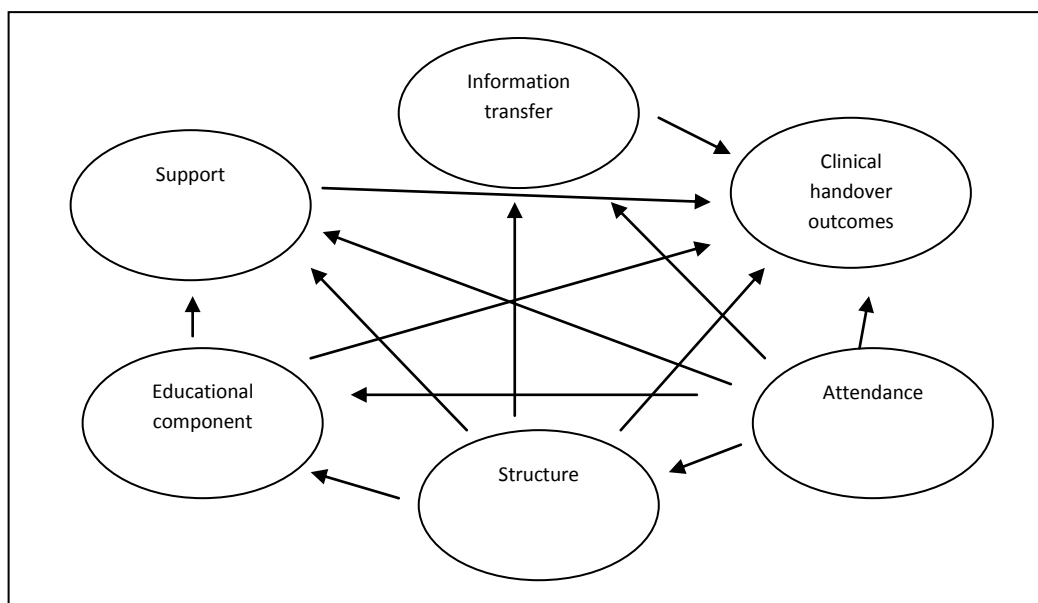


Figure 52: Relationships between axial codes in the core category CLINICAL HANDOVER EXPERIENCES

ATTENDANCE moderately influenced *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE* and *INFORMATION TRANSFER* and strongly influenced *CLINICAL HANDOVER OUTCOMES*.

SUPPORT moderately influenced *CLINICAL HANDOVER OUTCOMES*.

EDUCATION COMPONENT strongly influenced *SUPPORT* and *CLINICAL HANDOVER OUTCOMES*.

STRUCTURE moderately influenced *SUPPORT*, *EDUCATIONAL COMPONENT*, *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*.

INFORMATION TRANSFER strongly influenced *CLINICAL HANDOVER OUTCOMES*.

7.2.4.1 Attendance

Informal discussions with the Head of Department revealed that the requirements for all participants to attend clinical handover remained unchanged. Observation sessions identified that other than CON J, other consultants attended morning clinical handover sessions. It also appeared that consultants and registrars better understood their roles in clinical handover and made it a point to attend clinical handover sessions on time. They also made it a point to participate actively during handover. INT B_2007 indicated that most of the current clinical handover sessions were good as all teams were normally present at the handover and it was a sit-down meeting.

INT B_2007: Umm, a positive is with handover all teams are present, regardless, umm, and that it's usually a fairly clear thing, where we sit down, there is actually a physical handover of notes, umm and there is usually a clear idea of what needs to be done for patients, umm, yeah,

ATTENDANCE moderately influenced *SUPPORT*. While participants had to attend clinical handover sessions previously in order to provide and obtain support, the introduction of the electronic tool now enabled registrars to provide support to their interns through reading the information available on the electronic tool.

ATTENDANCE moderately influenced *EDUCATIONAL COMPONENT*. The observation sessions revealed that while the presence of consultants and registrars at handover provided some form of education for the interns about the management of patient, it was found that with the introduction of the electronic tool, registrars would often look at the information on the electronic tool and provide some form of education to their interns.

ATTENDANCE moderately influenced *STRUCTURE*. The presence of a consultant ensured good coordination during handover. In the absence of consultants, registrars often took on the lead role and ensured that there was a good structure in place. This was indicated by REG M_2007.

REG M_2007: Seems like the registrar's role is to run handover, Depends which handover we are talking about, and obviously there is the morning handover, which the consultants are there to receive the handovers. As well as the registrar, but not always the consultant. And the evening handover, it seems that, we are talking about the 10pm handover. It is the role of the registrar to run, The out-going registrar runs the handover. So, they basically give the handover and organise, so getting the interns to give their handovers as well, just co-ordinate that, so. I guess in the morning, the role of the registrar is to receive the handover. And in the evening is to give the handover.

ATTENDANCE moderately influenced INFORMATION TRANSFER. Information transfer for handover could not occur properly without the attendance of all relevant parties. While it was highlighted by REG R_2007 that the electronic tool could not be used to substitute effective communication as the role of the electronic tool was to support verbal handover, it did provide an additional mechanism for information transfer.

REG R_2007: *Um I think the other thing is that I'm sure you've, it's hard to use as a, you can't use it as a substitute for effective communication because, because electronics can't um can't allow you to express urgency and prioritise no matter how, you can put it in red you can put it in whatever colour but people just people have to know that somebody is sick and, and a verbal communication is the only way but it does help you*

ATTENDANCE strongly influenced CLINICAL HANDOVER OUTCOMES. REG M_2007 indicated that the outcomes of handover had been good because all the participants were attending handover sessions.

REG M_2007: *The good point is that we are all able to sit together and do the handover in the morning and I think pretty much from the time I have been here I've not missed out on any patients with any problems so far yes and it doesn't go too long so it is perfectly timed, I can't think of anything bad at the moment so.*

It was important that consultants attended handover. REG R_2007 indicated that the attendance of a consultant not only ensured better outcomes of handover but also ensured the attendance of handover by other participants.

REG R_2007: *I think the main role is just one to make sure that there are no problems, I don't see a huge problem at this stage maybe because I think the consultants are used to the idea of them themselves being present. I think that makes a big difference because there is no consultant input in most other hospitals at any clinical handover and I think having the consultants at all means the whole status of the handover process is elevated in the eyes of junior staff.*

7.2.4.2 Support

Two types of support were identified in this phase, social support and professional support. Observation sessions revealed that participants often utilised clinical handover time for social support. Participants from the two teams tended to spend some time prior to or after clinical handover for social interactions or allow the outgoing team a chance to vent their frustrations. It appeared that this was most prevalent for the participants working the night shift. Participants however, did not see this as an important aspect of their clinical handover experience. In fact, INT S_2007 was the only participant who highlighted this in the interview. He was however uncertain as to whether this was related to clinical handover.

INT S_2007: *I don't know I think handover has probably got a social side of the morning too it's where all the teams interact and get to know each other a bit but generally as a whole it's just the home team just gets their new admissions.*

Observation sessions revealed that clinical handover sessions were often used by participants as a time to seek second opinions. The outgoing team usually highlighted patients whose diagnosis was unclear and they often presented clinical data for further discussions. This process was important not only for patient care, and therefore the outcomes of clinical handover but also to

support junior clinicians at handover. REG S_2007 saw this as an important function of clinical handover.

REG S_2007: *if we are dealing with an interesting issue, or there is obviously, you now, maybe the night med reg or the intern wasn't sure what to do, that they ask a few people's opinions.*

This supervision and provision of feedback for the interns was not only important during handover but also important for the entire shift. The electronic tool gave the registrars a better idea of the patients who were on the ward and what their interns had to do during their shift. This provided an opportunity for the registrars to provide supervision and feedback for the jobs that the interns had to carry out for patient care. This is well described by REG S_2007 below.

REG S_2007: *Yes, unless someone actually told me to go see, said can you come and see this patient, or expressed concerns in the old handover system, whereas this way, if I sort of read it (the electronic clinical handover tool) and I feel well perhaps I should have a quick look at the person. It doesn't happen that often, but it, you know, I don't know whether I make any help, actually help them or make any difference to their safety, but if something does, one day something might happen and you know you might think oh well at least I tried to fix the problem before. Yeah, it's much safer than what we had, or didn't have.*

It appeared during observation sessions that the clinical handover tool allowed for participants to work better as a team if used appropriately and the registrars were able to provide better support for their interns.

SUPPORT moderately influenced *CLINICAL HANDOVER OUTCOMES*. This was especially in the case of professional support provided by senior clinicians who provided feedback and direction during clinical handover sessions during observation sessions.

SUPPORT was influenced by *ATTENDANCE* (see Section 7.2.4.1), *EDUCATIONAL COMPONENT* (see Section 7.2.4.2) and *STRUCTURE* (see Section 7.2.4.4).

7.2.4.3 Educational component

Clinical handover was a clinical activity which allowed for junior clinicians to learn about clinical practice as well as clinical presentation. It was a time when junior and senior clinicians gathered together in one place to discuss important patient management issues. This function was highly regarded by junior clinicians. REG S_2007 indicated that clinical handovers are enjoyable when there was an educational component involved.

REG S_2007: *Yes, I mean handovers, the good handovers are good, where you have the teaching and you have everyone sitting down and doing what they should do, umm, and I quite enjoy those handovers where you do get to learn something.*

EDUCATIONAL COMPONENT appeared to be emphasised more by junior clinicians after the introduction of the electronic tool. REG M_2007 indicated that clinical handover should be a learning experience for every participant involved.

REG M_2007: *I don't think that it should just be an exchange of information, I think it should be a learning experience for everybody as well. And I think that needs to be encouraged so that people get something out of it. And that's probably important.*

REG M_2007 even went on to say that there should be some time allocated for education at each handover session but acknowledged that this was not easy to implement.

REG M_2007: *I think in the ideal world, handover should have an educational focus as well, even if it is a 10 minutes talk or something like that. But hard to implement.*

EDUCATIONAL COMPONENT strongly influenced *SUPPORT*. The educational component of clinical handover was a secondary function to provide teaching to junior clinicians. Ideally, this role should be fulfilled by more experienced clinicians. However, REG S_2007 indicated that in the absence of the consultant, the most senior person in the room, i.e. the registrar, should take on the teaching role. She also explained that teaching should focus on practical issues and provide feedback and support for junior clinicians during handover. Observation sessions revealed that REG S_2007 and REG M_2007 provided a significant amount of education and training for junior clinicians during handover and they did this even at times when the consultant was present.

REG S_2007: *I guess, as a registrar, sometimes the consultants are there, so their role should be the teaching, and obviously we do have an element of that, but the most senior person there has the main teaching role, we do have a teaching role, perhaps with some of the smaller issues with the interns, things that they do, you know, over night, umm, but I think the main teaching role should be taken by the consultant, umm, [pause] yeah, that's probably the main role is to just to guide handover, provide, you know, the supervision, teaching, and just ensure that nothing gets missed really.*

The educational component of clinical handover was appreciated by interns. INT B_2007 indicated that one of the good things about attending clinical handover was the availability of teaching for all levels of staff.

INT B_2007: *The good thing is there could be a level of teaching maybe for all levels of staff, particularly the regs and the rmos and interns.*

While the educational component was seen as important and an integral part of clinical handover, it did not impact on the participants' experience apart from providing support.

EDUCATIONAL COMPONENT strongly influenced *CLINICAL HANDOVER OUTCOMES*. This was reflected in the interview by REG S_2007. REG S_2007 indicated that good handover occurred when there were discussions about interesting patients and education. If participants achieved some form of learning through the handover process, then it was a good handover. Therefore, the *EDUCATIONAL COMPONENT* had a direct relationship with *CLINICAL HANDOVER OUTCOMES*.

REG S_2007: *Yes, I mean handovers, the good handovers are good, where you have the teaching and you have everyone sitting down and doing what they should do, umm, and I quite enjoy those handovers where you do get to learn something, or there is an interesting patient that everyone gets talking about a little bit, umm, because of that, I mean that the intern overnight, has the opportunity to get involved and handover their issues overnight*

The role of the *EDUCATIONAL COMPONENT* in determining *CLINICAL HANDOVER OUTCOMES* was further emphasised by INT B_2007. Teaching for all levels of junior clinicians appeared to impact on the outcomes of clinical handover.

INT B_2007: I don't know, I guess if there could be a level of teaching maybe for all levels of staff, particularly the regs and the rmos and interns.

EDUCATIONAL COMPONENT was influenced by *ATTENDANCE* (see Section 7.2.4.1) and *STRUCTURE* (7.2.4.4).

7.2.4.4 Structure

Informal discussions with the Head of Department and the clinical handover project registrar indicated that there were no changes made to the handover structure. The same proceedings and guidelines were utilised during the handover sessions. The structure of clinical handover in the Department of General Internal Medicine varied depending on the time of day. There were officially three handover sessions in a typical working day that involve all team members. Morning handover occurred between 8:00 – 8:30am, evening handover occurred between 4:30 – 5:00pm and night handover between 9:30 and 10:00pm. The guidelines indicating how handover should be conducted was still attached on the notice board in the clinical handover room.

Observation session indicated that the agenda (see Appendix 1) for handover was followed commonly during morning handover. The consultant or registrar of the post take team often took on a lead role in ensuring the structure of handover was adhered to. The evening and night handovers however, did not follow the stated agenda. They were highly dependent on the participants themselves.

The interview data supported the observation data. REG M_2007 indicated that morning handover usually followed a structure as the team would be taking over the entire care of the patient.

REG M_2007: Yeah, evening handover it doesn't. Morning handover does. In the morning, you are receiving a patient to actually look after; you will be taking over their whole entire care, so... umm....

Observation sessions indicated that evening and night handovers lacked structure and sometimes did not even occur. According to REG M_2007, junior clinicians seemed to place more emphasis on completing clinical work rather than attending handover. The lack of attendance affected the structure of handover.

REG M_2007: But it generally, my experience, happened in an adhoc fashion. So, the problem is everyone is trying to get their jobs done before 5:00pm or 5:30p.m. or 6:00p.m. whenever it is so that they can go home

STRUCTURE moderately influenced *SUPPORT* and *EDUCATIONAL COMPONENT*. REG S_2007 indicated that different handovers served different purposes. During a morning handover, adhering to a set structure was important to ensure that things were done in an orderly fashion and the role of the registrar during morning handover was to take a lead role to ensure that everyone had a chance

to participate. *SUPPORT* and *EDUCATION COMPONENT* were provided when participants presented and discussed about patient conditions.

REG S_2007: *Umm, I guess, our morning handover and our after-hours handover is slightly different, we have different roles, we have different goals... Morning handover, our role in the morning handover is, I mean as a registrar is to lead the morning handover, umm and to ensure that things are done in an orderly fashion, and that everyone who has been involved in the care of the patient in the past 24 hours has the opportunity to have their say and let the other people know what has gone on, umm*

STRUCTURE moderately influenced *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*. This point was reflected in the interview statement by REG S_2007 who emphasised the importance of having a set structure for clinical handover with proper leadership and the appropriate attendees. Without a set structure, information transfer might not have occurred and the outcomes of clinical handover might not have been achieved.

REG S_2007: *I think making sure that you have a similar order every day, and that someone, you know, like med reg night, post-take the team, is important, and then you know, you follow the structure. Because I think unless you have that, everyone obviously try's to hand things over in the corridor, umm you need someone who is going to be the leader, which could just be the post-take reg or the night reg, it doesn't really matter who that is, as long as someone's saying "ok, these people's turn to talk, umm.*

The relationship between *STRUCTURE* and *INFORMATION TRANSFER* as well as *CLINICAL HANDOVER OUTCOMES* changed after the introduction of the electronic tool. *INFORMATION TRANSFER* during handover was influenced by *STRUCTURE* but not completely as information can still be transferred electronically without structure or attendance. The outcomes of clinical handover might still be achieved in the event of the availability of the electronic clinical handover notes without face-to-face handover taking place.

STRUCTURE was influenced by *ATTENDANCE* (see Section 7.2.4.1).

7.2.4.5 Information transfer

Observation sessions revealed that there were multiple ways in which information was transferred after the introduction of the electronic tool. Firstly, information was transferred electronically via the electronic tool where one team entered the handover information and the next team retrieved it. Secondly, information was transferred when participants sat down to discuss about the patient's condition face-to-face. The information in the electronic tool often complemented what was discussed face to face and was not a duplication of the information presented face-to-face. In an observation session conducted, INT D_2007 indicated that the routine information had been entered into the computer and that they should now discuss about a few patients who were more important. There was therefore a reciprocal relationship between *STRUCTURE* and *INFORMATION TRANSFER*. A good structure assisted in information transfer. The introduction of an alternative method for the transfer of information, i.e. the electronic tool impacted on the structure of handover.

While the term information transfer was used commonly, further analysis of the data indicated that participants often meant discussions as information transfer would imply a uni-directional information flow. Observation sessions indicated that information was exchanged both ways

during handover and this appeared to be the important part of clinical handover. REG M_2007 highlighted the importance of sitting down together in order to discuss about patients.

REG M_2007: *The good point is that we are all able to sit together and do the handover in the morning and I think pretty much from the time I have been here I've not missed out on any patients with any problems so far yes and it doesn't go too long so it is perfectly timed, I can't think of anything bad at the moment so.*

This view was echoed by INT S_2007 who indicated that it was necessary to have direct interactions between the incoming and outgoing team. Therefore, a direct face-to-face discussion appeared to be important for handover.

INT S_2007: *I think they are very beneficial and necessary to have that interaction between the changing teams it forces us to have that hand over between the person who has seen the patient and the person who has not seen the patient and will be taking over their care so you've got no middle man to play Chinese whispers and stuff it up I think that's good.*

INFORMATION TRANSFER strongly influenced CLINICAL HANDOVER OUTCOMES. The information that had been transferred should be made available after the clinical handover sessions for review and action. INT D_2007 illustrated this point well in her interview.

INT D_2007: *I think it is a good thing that we have this I mean the electronic handover is quite a good idea cause when you write everything up and the other person can go back to it and tick off what he or she has done is a great thing but not so you know when someone is telling something because they can say you didn't tell me this or that, I mean it should be actually written down so everyone can check what was handover and everyone can check what was done and who has done it.*

This emphasis on information exchange in order to achieve a good outcome was echoed by INT S_2007 in his interview. There appeared to be a very strong relationship between INFORMATION TRANSFER and CLINICAL HANDOVER OUTCOMES.

INT S_2007: *Hmm... Clinical handover is a transfer of information about patients under your care. And you are transferring the care of the patient from one person to someone else. So you need to make sure that they know the relevant information on what you worry about, what you want to have followed up, regarding the people that you are transferring care. I guess.*

INFORMATION TRANSFER was influenced by ATTENDANCE (see Section 7.2.4.1) and STRUCTURE (see Section 7.2.4.4).

7.2.4.6 Clinical handover outcomes

CLINICAL HANDOVER OUTCOMES was influenced by ATTENDANCE (see Section 7.2.4.1), STRUCTURE (see Section 7.2.4.4) and INFORMATION TRANSFER (see Section 7.2.4.5).

The introduction of the electronic tool did not change the fact that ATTENDANCE, STRUCTURE and INFORMATION TRANSFER influenced CLINICAL HANDOVER OUTCOMES. It encouraged face-to-face meetings and facilitated information exchange but did not alter the outcomes of clinical handover.

The introduction of the electronic tool did not change the relationship amongst these axial codes. Rather, it had enhanced the relationships. REG S_2007 had used the electronic tool to provide

support and to be involved in the information exchange between interns in order to achieve the best outcomes for the patients.

REG S_2007: *The patients list and the, yeah, I think the interns use the handover stuff more than we do, because we only really see the sick patients, that we have to, and often the interns will call us, just do that, so yeah from the review and issue section or boxes, whatever, I don't necessarily use those, except for the weekend, I'll have a quick flick through, see if there's someone who sounds a bit sicker than ?, just in case, it doesn't mean I necessarily need to see them, but if something happens then I know I've looked at their blood or understand their problem and provide interns with some support and education.*

7.2.4.7 Preliminary findings from core category CLINICAL HANDOVER EXPERIENCES

Table 19 provides a summary of the unilateral relationships between the core category CLINICAL HANDOVER EXPERIENCES.

The axial code	Influenced the axial code	Phase Three
Attendance	Support	Moderate
	Educational component	Moderate
	Structure	Moderate
	Information transfer	Moderate
	Clinical handover outcomes	Strong
Support	Educational component	-
	Structure	-
	Information transfer	-
	Clinical handover outcomes	Moderate
	Attendance	-
Educational component	Structure	-
	Information transfer	-
	Clinical handover outcomes	Strong
	Attendance	-
	Support	Strong
Structure	Information transfer	Moderate
	Clinical handover outcomes	Moderate
	Attendance	-
	Support	Moderate
	Educational component	Moderate
Information transfer	Clinical handover outcomes	Strong
	Attendance	-
	Support	-
	Educational component	-
	Structure	-
Clinical handover outcomes	Attendance	-
	Support	-
	Educational component	-
	Structure	-
	Information transfer	-

Table 19: Summary of relationships between axial codes in core category CLINICAL HANDOVER EXPERIENCES

The following presents the preliminary findings from core category CLINICAL HANDOVER EXPERIENCES:

1. Participants now made it a point to attend clinical handover sessions on time and participate actively in the clinical handover sessions (see Section 7.2.4.1).
2. Clinical handover sessions were still used for providing support (see Section 7.2.4.2) and providing an educational component (see Section 7.2.4.3) but the introduction of the

electronic tool meant that registrars did not necessarily have to physically be present at the clinical handover session in order to obtain the required information.

3. The introduction of the electronic tool had provided an additional method to transfer information to ensure the continuity of patient care (see Section 7.2.4.5).

7.2.5 IT/IS considerations

IT/IS considerations was the fifth core category identified and refers to the effect the electronic tool had on the practice and experiences of clinical handover as well as the participants. This featured strongly in the post-implementation observations and interviews and was coded as a separate core category.

It is important to note that during the trial period, the intended primary users of the electronic tool were to be the interns and not the registrars and consultants. Registrars had indicated that they wanted to continue with the manual paper based system. Consultants remained relatively detached from clinical handover and the utilisation of the electronic tool. This section therefore concentrates on interns through their experiences of using the electronic tool.

Five axial codes were identified in this particular core category. These axial codes are defined below.

- *IT KNOWLEDGE* refers to how much users know about IT and how much IT training they have had prior to the introduction of the electronic tool.
- *TOOL USE* refers to whether participants have utilised the program for clinical handover.
- *IT ISSUES* refers to issues identified with the current electronic clinical handover prototype
- *CLINICAL SIGNIFICANCE* refers to the potential impact of the electronic clinical handover tool on clinical outcomes.
- *USER EXPERIENCE* refers to what users think about the electronic clinical handover system, described through their utilization of the system during clinical handover.

The relationships of these six axial codes are illustrated below.

Figure 53 provides an illustration of the relationships between axial codes in the core category IT/IS CONSIDERATIONS.

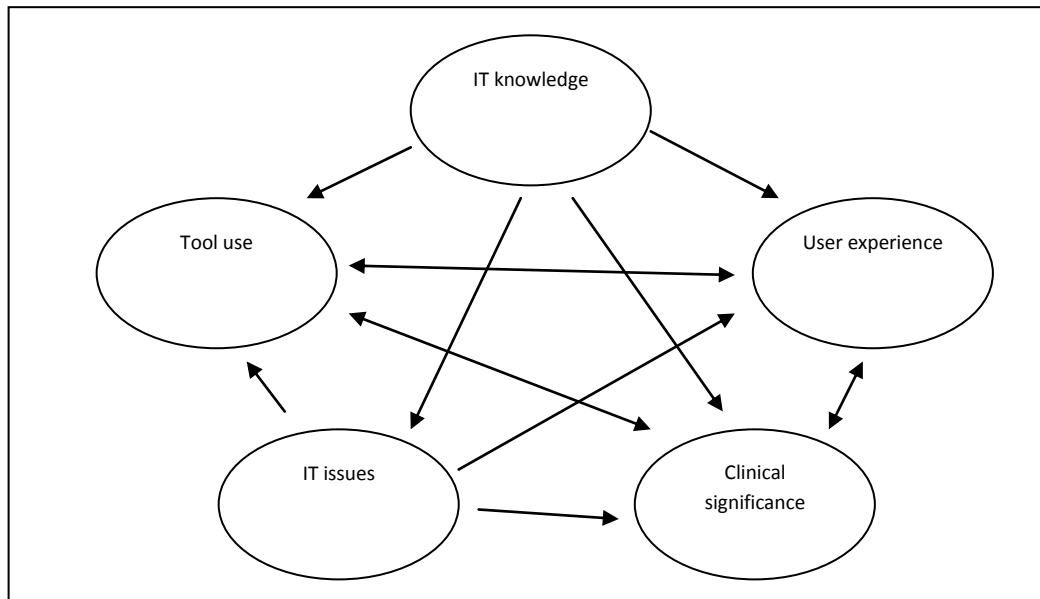


Figure 53: Relationship within core category IT/IS considerations

IT KNOWLEDGE strongly influenced *TOOL USE*, *USER EXPERIENCE*, *IT ISSUES* AND *CLINICAL SIGNIFICANCE*.

TOOL USE strongly influenced *CLINICAL SIGNIFICANCE* and *USER EXPERIENCE*.

IT ISSUES strongly influenced *TOOL USE*, *CLINICAL SIGNIFICANCE* and *USER EXPERIENCE*.

CLINICAL SIGNIFICANCE strongly influenced *USER EXPERIENCE*

USER EXPERIENCE strongly influenced *CLINICAL SIGNIFICANCE*.

7.2.5.1 IT knowledge

Observation sessions conducted after the introduction of the electronic tool revealed that some participants were very eager to use the tool while some others were very reluctant to use them. Analysis of the data identified that not all participants had a good knowledge about the use of IT and some preferred pen and paper rather than electronic tools.

IT KNOWLEDGE strongly influenced *TOOL USE*. Participants who had good IT knowledge tended to accept and used the electronic tool well. When they encountered problems in using the electronic tool, they tried to find solutions to the problem as they are familiar with the technology. This relationship was best demonstrated by INT S_2007. INT S_2007 utilised the electronic tool without actually attending the education and training sessions held to assist with the participants with the use of the tool. She believed that her knowledge in IT enabled her to use the electronic tool with ease and did not encounter many problems. This was confirmed by observation data.

INT S_2007: *I have a feel that and I think I am alright, but it is just... it is ok. I think it is pretty straight forward, and the fact that I could figure out how to use it without actually being told, you know, I don't know, I guess I, like I grown up with computers so, I am reasonably good at, like reasonably familiar with and like using it wasn't too much of a problem.*

IT KNOWLEDGE also strongly influenced CLINICAL SIGNIFICANCE and USER EXPERIENCE. INT B_2007 described himself as someone who was inclined to use technology. In fact, he even suggested that mobile technology should be used so that clinical handover could be conducted near the patient's bedside. Because of his knowledge of IT, INT B_2007 used the computers on the wards located near the patient's bedside for clinical handover. According to INT B_2007, this resulted in a positive clinical impact through the use of the tool as well as a good user experience.

INT B_2007: *I mean, I do, umm well yeah I'm inclined in that way, whereas some people aren't and one of the other interns made the note that if we all had PDAs that hooked into it, it might be a lot easier as well, because when we're at the bedside we can actually tick off, yes, I've done that, I thought that was reasonable, but then again, there's other problems, people still wouldn't be able to use it because of time constraints and other things.*

IT KNOWLEDGE had a strong influence on IT ISSUES. While the lack of IT knowledge most certainly led to participants encountering more problems with the use of the electronic tool, participants with a high level of IT knowledge still experienced many problems relating to the use of the electronic clinical handover tool. These problems might be different or less severe but nevertheless, these problems still existed. These relationships were illustrated by INT B_2007 above.

REG G_2007 was observed as not using the electronic tool and complained of multiple problems as well as the potential negative impact of the electronic tool. REG G_2007 indicated that she had poor IT knowledge and therefore found it difficult to utilise the technology available for clinical practice. She also indicated that the technology had slowed down her work. Her experience with technology was negative. The relationship between IT knowledge and other axial codes is clearly demonstrated by REG G_2007's interview excerpt below.

REG G_2007: *I'm not computer literate, I'm a bit older than the others, I didn't grow up on computers so I find computers a big problem – when I moved to XXX (a hospital with computer records), I nearly died. By the end of the time I got used to it but I tend to want to do a verbal handover anyway with the night person so I would find it very hard to change, I think you'd have to start with people that haven't been exposed to other methods and I'm not saying that I wouldn't but I find computers really hard to use if it involves anything where you have to put in graphs, I'm very slow so this is quicker for me that's the only reason.*

The relationship between IT knowledge and the other axial codes was complex. This relationship could be strengthened if registrars and consultants also participated in the utilisation of the electronic tool.

7.2.5.2 Tool use

Observation sessions revealed that interns utilised the electronic tool routinely only on weekends and extended holiday periods but not weekdays. Registrars sometimes read through the clinical handover messages recorded on the electronic tool but did not actively utilise the tool.

TOOL USE was also influenced by other participants' *IT KNOWLEDGE* and *TOOL USE*. This was especially so in the hierarchy of medicine. Senior clinicians had an impact on the *TOOL USE* of more junior clinicians as demonstrated by INT E_2007. The *IT KNOWLEDGE* and *TOOL USE* of a more senior clinician had a direct impact on the *TOOL USE* of more junior clinicians.

INT E_2007: Ah..... ..Some individuals close their minds about it, preventing it from being more useful than it is. Umm... .. more probably older staff who probably haven't used electronic handover system before. I think the younger staffs are probably more accepting it, especially just electronic stuff in general. Because the older staff, I do not use it sometimes, as they discourage us from using it.

TOOL USE had a strong influence on *CLINICAL SIGNIFICANCE*. Participants did not necessarily utilise the electronic tool all the time and when they did, they did not necessarily use it in the way in which it was designed to be use. For example, INT B_2007 used both the electronic tool combined with verbal handover. However, he did not check if the completed tasks had been ticked off. This then affected the clinical significance of the tool as the information on the tool became less reliable.

INT B_2007: No, not generally, I mean I'll hand over tasks specifically that I think these need to be done, there's this, this and this, umm I don't usually follow-up whether they've been ticked off or not, I just actually go and, you know you tend to notice the next ward round you do whether they've been done or not, umm yeah so

TOOL USE influenced the *CLINICAL SIGNIFICANCE* of the electronic tool not only for the user but also all other participants at clinical handover and the clinical management of the patients.

TOOL USE strongly influenced *USER EXPERIENCES*.

7.2.5.3 IT issues

Observation sessions revealed that participants were utilising the electronic tool without many problems. The researcher and the clinical handover project registrar were available during the trial period to provide assistance. Participants did not indicate that they had experienced problems apart from the lack of space for writing notes about the patients in the computer printout.

The interview data however, revealed quite different results. Some of the problems voiced were purely design problems. These included leaving adequate space for writing notes, the ability to print in portrait form, the ability to print comments and background information, data and time availability regarding blood tests and the tasks themselves. An example was provided by INT S1_2007 who indicated that that there should be a date for the entry of the tasks.

INT S1_2007: I mean once you've printed it out so on the hard copy itself so not only for the task itself that there should be a date, I mean you can just write in a date but just having you know having some sort of calendar or something.

One of the unanticipated problems during the trial period was the provision of education and training to the participants on the use of the electronic tool. While the department provided many training sessions for their staff, interns from other specialties would cover medical wards during weekends. INT S_2007 indicated she had not had an opportunity to attend the training sessions but was quite happy to learn on the job.

INT S_2007: *I think that is good. I think it is reasonably straight forward. Just as well because I wasn't actually shown how to use it before I started as a medical intern. Yeah, I think, I think, that probably need to be looked at because I am not generally a medical intern but I cover the medical roster, like, might want to make sure that people that are coming through.*

While participants were able to see the positive clinical impact of the electronic tool, they might not continue to use the electronic tool if the electronic tool took up too much of their time. The problem with an increased workload and time constraints was described by INT A_2007, INT S_2007 and INT S1_2007.

Other IT issues encountered was the appropriate use of the electronic tool. While a lot of thought had been put into the design of the tool to maximise its potential in clinical care, the participants' use of the electronic tool might not achieve that result. The electronic tool had safety features built in allowing for completed tasks to be checked so that participants were aware of which tasks had been completed and which were outstanding. Another safety feature is the prioritisation of urgent tasks at hand so that those tasks would be dealt with first. This was designed in conjunction with the participants at the design workshops. However, problems were encountered when it was put to practice. Participants did not utilise the tool appropriately in order for those functions to work properly. An example of this was provided by INT S_2007.

INT S_2007: *umm... I think it is reasonably straight forward, some of the tasks that people get you to do, they will say things like check blood Monday, Thursday, Friday, Saturday, Sunday all in one thing. So even if you have checked it, you still can't tick it off, because you want to do it. Those kind of things are a bit frustrating. Ahmm... The whole prioritizing patient issues, probably need, people like need to be given a bit of a ear-bashing, like what do they actually mean by cat 1.*

IT ISSUES strongly influenced TOOL USE. It was noted that use of the electronic tool within the department was voluntary as the department had not mandated that all participants utilise the tool for clinical handover. This had resulted in the data in the electronic tool not being accurate and affected the participants' use of the electronic tool. INT S_2007 indicated that because not everyone was using the electronic tool all the time to update the data it had compromised the accuracy of the data.

INT S_2007: *Oh well not trust it the actual system itself, the communication as such, or relying on someone to use it or me actually doing it appropriately I guess so I do it but then like a lot of my tasks that I put on there still haven't been checked off so I don't know if that's a sign that somebody doesn't know how to use it, somebody's just not doing it or they've read it and they just couldn't be bothered so again I'm just covering my bases*

Observations sessions revealed that participants who encountered problems often did not continue to use the electronic tool.

IT ISSUES strongly influenced USER EXPERIENCES. If participants encountered many IT problems, they would not use the tool as they did not have a good experience while using it. INT D_2007 indicated that the electronic tool was good as it allowed for both verbal and written handover. However, it required a lot of time and this had a negative impact on user experience.

INT D_2007: *Because when you have what we do now when we have verbal handover first of all many things can be missing or you get as I said someone is writing something down they can lose their notes and then they have nothing to go back to. Of course there is time has it's pros and cons because it is very time consuming I must say at the beginning when I have tried to do it it takes quite a lot of time but anyway it's a really good idea. Because of time, I don't use it much now.*

IT ISSUES strongly influenced *CLINICAL SIGNIFICANCE*. This was a reciprocal relationship which will be discussed in Section 7.2.5.4.

IT ISSUES was influenced by *IT KNOWLEDGE* (see Section 7.2.5.1).

7.2.5.4 Clinical significance

The *CLINICAL SIGNIFICANCE* of the electronic clinical handover tool refers to the potential impact as this thesis did not measure the actual clinical impact of the electronic tool. This axial code is purely based on the participants' perceptions of the clinical impact of the electronic tool.

The *CLINICAL SIGNIFICANCE* of the electronic tool was firstly based on its ability to archive and retrieve information, i.e. provision of formal documentation for clinical handover messages. As indicated by INT D_2007, the usefulness of the electronic tool was the ability for other participants to access that information whenever they wanted. Observation sessions revealed that this had changed the way that handover was practiced as not all information had to be discussed apart from those patients whose care required clarification or further discussions.

INT D_2007: *I think it is a good thing that we have this I mean the electronic handover is quite a good idea cause when you write everything up and the other person can go back to it and tick off what he or she has done is a great thing but not so you know when someone is telling something because they can say you didn't tell me this or that, I mean it should be actually written down so everyone can check what was handover and everyone can check what was done and who has done it.*

Despite the fact that the electronic tool provided a good mechanism for formal documentation, problems associated with increased workload and time constraints led to clinicians not using that on weekdays. The electronic tool was only used over the weekend and extended holidays. This had significant impact on the clinical significance of the electronic tool.

INT S_2007: *Weekends, I definitely use it for weekends a lot and the holidays. Weekends and holidays. I mean weekends and holidays I definitely use it, and public holidays, especially if the public holiday smash in the middle of the weekend, then I am sure that people will use it. Umm... but I don't think that I will use it overnight. One thing is that the night intern is often flat-chat and wouldn't have a chance to look at it anyway. But, something is going to pop up overnight that we haven't managed, then that is going to be dealt with, no matter what has been written in handover. If that does make sense. So, I don't think that's going to be used overnight, no. **What specifically do you use it for?** I use it for passing on umm... jobs over the weekend periods. That's about it.*

This point was highlighted by INT D_2007, INT A_2007, INT S_2007 and INT SA_2007. It would make a big difference to the clinical significance of the electronic tool if time constraints and workload was not an issue.

INT A_2007: *What I think is for the day-to-day handovers the electronic system it consumes more time and ah but it is good for the long weekends, it is good for the long weekends because it maintains the reliability over the long weekends, but over day-to-day things it is good that one-to-one handover takes place*

While majority of the participants thought that the electronic tool is time consuming, some participants recognised that that it would save time in the long run. INT B_2007 indicated that the electronic tool had a very positive clinical significance as it could transfer a lot of information for a lot of patients and this saved time. The ability to rapidly transfer information and the potential for time saving is important. *USER EXPERIENCE* improves if *CLINICAL SIGNIFICANCE* improves.

INT B_2007: *Umm [pause] I think its better than it was, in the sense that it is easier for teams to be handed over, umm a lot of information about a lot of patients fairly quickly after hours*

One of the aspects of clinical significance which was rarely highlighted by participants is the medico-legal responsibility of a clinician at handover. INT S_2007 indicated that as the electronic tool allowed for clear documentation even for patients who had not been verbally handed over, the responsibility of the care of the patient had been passed on to the next team. This appears to have a positive *CLINICAL SIGNIFICANCE*.

INT S_2007: *I don't know it's just another check I guess so if you don't actually physically get to see the person that you're handing over to which you generally as a whole don't, you know exactly what is going to be stated to them because you're the one writing and stating it and it is their responsibility to print that list out so medically- legally you're covering your self*

The electronic tool allowed for participants to access clinical handover information about a patient more rapidly as compared with manually going through handwritten clinical handover notes leading to more efficient patient care.

INT S_2007: *I mean you have a bit of a snapshot view of what is going on before you begin. As you often don't get time to like review, well I mean you know, you do later on, but initially you don't get time to review the notes and see what the problems are and the patients, or the nursing staffs called you about someone, you can quickly look up and see the, are they on your list and have a bit of a background as to what's going on. So, I think it is good.*

There was a reciprocal relationship between *CLINICAL SIGNIFICANCE* and *USER EXPERIENCE*. INT E_2007 indicated that if the user experience was good and participants continued to use the electronic tool, the tool had a great potential to improve safety and improve patient care.

INT E_2007: *I think that for the people who use it, and use it well, it would have prevented, it would have improved patient safety, and it has the potential to do. I suppose especially over the weekend period, which is, you know one of the main areas where things get lost. Because there is different staffs on and night interns change and things like that. So, I think it is, once it is used, then it will benefit. And if it is beneficial, we will use it.*

It can therefore be concluded that participants would continue to use the electronic tool if they thought that the electronic tool would contribute to patient safety. As such, *CLINICAL SIGNIFICANCE* strongly influenced *TOOL USE*.

7.2.5.5 User experience

Observation sessions and informal chats with the participants have revealed that they had mixed reactions to the electronic tool. Firstly, it was acknowledged that the electronic tool had some benefits and the participants generally had a good experience with it, especially during the long weekend. However participants only voiced the problems encountered upon completion of the prototype and at the start of the trial. The researcher found that there was insufficient time to address the issues highlighted at that point.

Despite having good experiences with the tool, many participants still stressed the need to have a verbal handover together with the use of the electronic tool. After all, the electronic tool was designed to complement and not replace face-to-face handover. INT D_2007 has indicated that she would not rely on the electronic tool alone, preferring to use a combination of a manual system and the electronic tool.

INT D_2007: it's very important for both of them but having what someone told me having both of them written up then I can go back and I can tick off things and then someone can go back to it I think it is good and very helpful but obviously I would not rely on electronic handover at all, only on electronic one, no.

The usefulness of the electronic tool was echoed by both INT A_2007 and INT B_2007. INT A_2007 indicated that while at the moment, the electronic tool was time consuming to use, she acknowledged that with time, it would get easier.

INT A_2007: It is easy to use, it is not very difficult but it takes some time to get used to that system and it might be when we use it more when we will need less time to handover the things on it but at the moment it consumes a lot of time.

INT B_2007 indicated that his experience of the electronic tool was good. This was especially the case during the weekend when all participants entered clinical handover messages into the electronic tool. This established the relationship between *TOOL USE*, *CLINICAL SIGNIFICANCE* and *USER EXPERIENCE*.

INT B_2007: Good points are that there is some pathology results available, and you can, it's great for things like weekends where you've got people looking after multiple patients on multiple units, where an actual verbal handover wouldn't be sufficient for it, umm, yeah, it, and as I said the ability to access it from anywhere in the hospital is a good point

INT B_2007 indicated that the availability of pathology results contributed to a positive user experience for participants. However, this view was not shared by INT E_2007. INT E_2007 did not use the pathology results because his registrar questioned the accuracy of the results. As his registrar was not very technologically inclined, she did not accept the use of technology very well.

INT E_2007: Umm... my registrar doesn't like using those blood results, because she doesn't feel that it is accurate. Which she has experienced, I haven't. So, she may be right she maybe wrong, I don't know. So, I don't use it, she wouldn't believe it and she will check them again anyway, so, there is no point. What other functions are there?

INT E_2007 however used the electronic tool over the weekends. During weekdays, INT E_2007 did not see the perceived benefits of using the electronic clinical handover tool. This interview re-enforces the relationship between *CLINICAL SIGNIFICANCE* and *TOOL USE*.

INT E_2007: *It is great for the weekends. When you know that it is two days away and you need jobs done on both days. I don't think that I have used it for the week days. Because I don't think I will have any jobs and even if I do, couple of jobs, I don't feel the need to, I don't feel the need to integrate with the electronic handover.*

The relationships between *USER EXPERIENCE*, *IT KNOWLEDGE*, *TOOL USE*, *IT ISSUES* and *CLINICAL SIGNIFICANCE* are complicated and interrelated. Observation sessions conducted confirmed the interview data as described above.

7.2.5.6 Preliminary findings from core category IT/IS CONSIDERATIONS

Table 20 provides a summary of the unilateral relationships between axial codes in the core category IT/IS CONSIDERATIONS.

The axial code	Influenced the axial code	Phase Three
IT knowledge	Tool use	Strong
	IT issues	Strong
	Clinical significance	Strong
	User experiences	Strong
Tool use	IT issues	-
	Clinical significance	Strong
	User experiences	Strong
	IT knowledge	-
IT issues	Clinical significance	Strong
	User experiences	Strong
	IT knowledge	-
	Tool use	Strong
Clinical significance	User experiences	Strong
	IT knowledge	-
	Tool use	Strong
	IT issues	-
User experiences	IT knowledge	-
	Tool use	Strong
	IT issues	-
	Clinical significance	Strong

Table 20: Summary of relationships between axial codes in core category IT/IS considerations

The following presents the preliminary findings from core category IT/IS CONSIDERATIONS:

1. The participants' IT knowledge was an important consideration in the introduction of an electronic tool as it influenced tool use, IT issues, clinical significance and user experience (see Section 7.2.5.1).
2. Tool use should be mandatory and not voluntary as it influences the clinical significance of the tool and the reliability of the information presented via the tool (see Section 7.2.5.2).
3. IT issues influenced user experiences and tool use and should be dealt with as soon as possible (see Section 7.2.5.3).

4. The clinical significance of the electronic tool is determined by tool use and user experience (see Section 7.2.5.4). The clinical significance of the electronic tool could only be achieved if all participants utilised the electronic tool.
5. A positive user experience was important in ensuring the sustainability of the electronic tool (see Section 7.2.5.5).

7.3 Relationship between core categories in Phase Three

This section provides a detailed description of the five core categories in Phase Three which emerged from the coding process described in Chapter 3. These five core categories are: DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, IT/IS CONSIDERATIONS and CLINICAL HANDOVER EXPERIENCE.

The five core categories are defined as follows:

- DEPARTMENTAL REQUIREMENTS refers to directions instituted by the Department of General Internal Medicine for clinical handover. There are four axial codes associated with this core category – *POLICIES AND GUIDELINES*, *CLINICIAN ROLES*, *EDUCATION AND TRAINING* and *HANDOVER CULTURE*.
- PARTICIPANT ATTRIBUTES refers to the characteristics of the participants who are involved in handover. There are six axial codes associated with this core category: *UNDERSTANDING*, *EXPECTATIONS*, *INDIVIDUAL PERSONALITIES*, *COMMUNICATION STYLES*, *CULTURAL BACKGROUND* and *BEHAVIOUR*.
- ENVIRONMENTAL CONSIDERATIONS refers to the environment in which clinical handover is being conducted as well as environmental factors which impact on clinical handover. There are five axial codes associated with this core category: *WORKLOAD*, *VENUE*, *DISTRACTIONS*, *IT INFRASTRUCTURE AND SUPPORT* and *TEAM DYNAMICS*.
- CLINICAL HANDOVER EXPERIENCES refers to the participants' experiences of handover at the Department of General Internal Medicine. There are six axial codes associated with this core category: *ATTENDANCE*, *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE*, *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*.
- IT/IS CONSIDERATIONS refers to the issues arising and the impact of electronic clinical handover tool on handover. There are five axial codes associated with this core category: *IT KNOWLEDGE*, *IT ISSUES*, *TOOL USE*, *CLINICAL SIGNIFICANCE* and *USER EXPERIENCE*.

The relationships between the five core categories are illustrated in Figure 54.

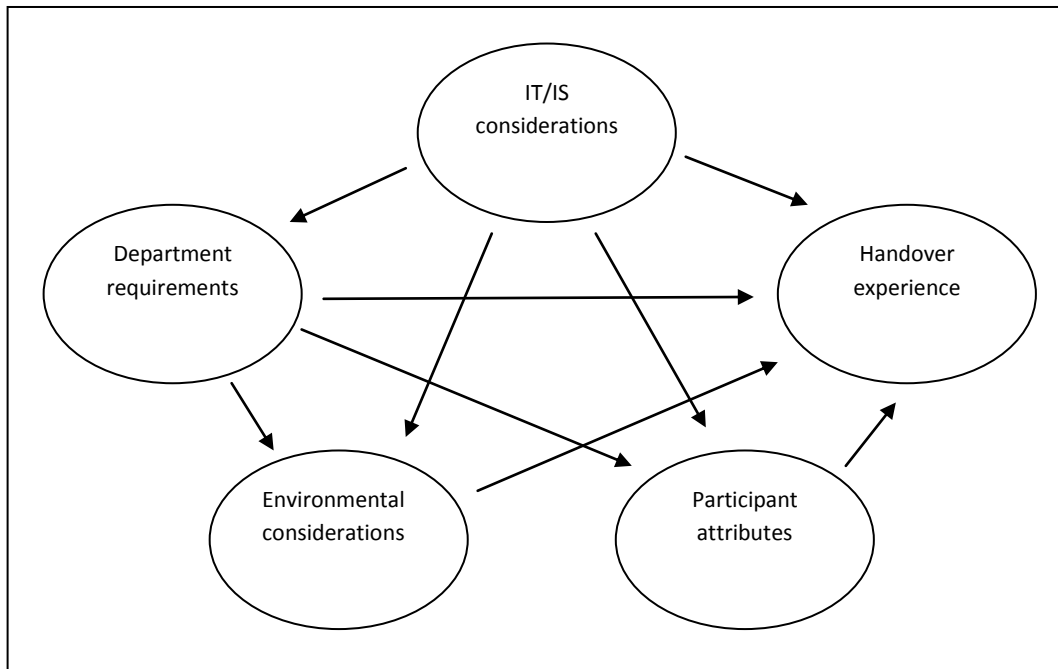


Figure 54: Relationship between core categories in Phase Three

DEPARTMENTAL REQUIREMENTS influenced PARTICIPANT ATTRIBUTES. This was primarily due to the *POLICIES AND GUIDELINES* in place and *EDUCATION AND TRAINING* of staff which had an impact on the *UNDERSTANDING, EXPECTATIONS, COMMUNICATION STYLES* and to a certain extent *BEHAVIOUR*. *DEPARTMENT TRADITION* had no longer been identified as a core category after the introduction of the electronic tool. A new axial code within DEPARTMENTAL REQUIREMENTS was *HANDOVER CULTURE* which influenced PARTICIPANT ATTRIBUTES. DEPARTMENT REQUIREMENTS also influenced ENVIRONMENTAL CONSIDERATIONS. DEPARTMENT REQUIREMENTS determined *WORKLOAD, VENUE* and *DISTRACTIONS* and these influenced *TEAM DYNAMICS*. DEPARTMENT REQUIREMENTS also shaped CLINICAL HANDOVER EXPERIENCES. DEPARTMENT REQUIREMENTS provided the basis for *ATTENDANCE, SUPPORT, EDUCATIONAL COMPONENT, STRUCTURE* and *INFORMATION TRANSFER* at handover. These affected the accuracy of handover. It was important to note that IT/IS CONSIDERATIONS influenced DEPARTMENTAL REQUIREMENTS. *IT ISSUES, IT KNOWLEDGE* and *CLINICAL SIGNIFICANCE* influenced *EDUCATION AND TRAINING, POLICIES AND GUIDELINES* as well as *HANDOVER CULTURE*.

PARTICIPANT ATTRIBUTES was influenced by DEPARTMENT REQUIREMENTS. PARTICIPANT ATTRIBUTES was also influenced by IT/IS CONSIDERATIONS. IT/IS CONSIDERATIONS, especially *TOOL USE, CLINICAL SIGNIFICANCE* and *USER EXPERIENCE*, influenced *UNDERSTANDING, EXPECTATIONS, COMMUNICATION STYLES*, as well as *BEHAVIOUR*. PARTICIPANT ATTRIBUTES played a significant role in CLINICAL HANDOVER EXPERIENCES. It not only influenced a participant's individual handover experience but also other participants' experiences. It also changed *BEHAVIOUR* during clinical handover.

ENVIRONMENTAL CONSIDERATIONS was related to DEPARTMENTAL REQUIREMENTS, IT/IS CONSIDERATIONS and CLINICAL HANDOVER EXPERIENCES. DEPARTMENTAL REQUIREMENTS had a little influence on ENVIRONMENTAL CONSIDERATIONS through *POLICIES AND GUIDELINES* and

EDUCATION AND TRAINING. IT/IS CONSIDERATIONS, especially *IT KNOWLEDGE*, *USER EXPERIENCE*, *TOOL USE* and *IT ISSUES* had a significant impact on ENVIRONMENTAL CONSIDERATIONS, especially in regard to *WORKLOAD*, *VENUE* and *TEAM DYNAMICS*. ENVIRONMENTAL CONSIDERATIONS had a direct impact on CLINICAL HANDOVER EXPERIENCES as it had an impact on how handover was conducted and participant's experiences of handover.

IT/IS CONSIDERATIONS influenced all other core categories. IT/IS CONSIDERATIONS had direct impact on ENVIRONMENTAL CONSIDERATIONS and DEPARTMENTAL REQUIREMENTS. There was however a more significant impact on PARTICIPANT ATTRIBUTES and CLINICAL HANDOVER EXPERIENCE. In particular, IT/IS CONSIDERATIONS also modified the relationship between PARTICIPANT ATTRIBUTES and CLINICAL HANDOVER EXPERIENCES. *IT ISSUES*, *IT KNOWLEDGE*, *CLINICAL SIGNIFICANCE* and *USER EXPERIENCE* had a direct impact on *SUPPORT* provided, *EDUCATIONAL COMPONENT*, *STRUCTURE* and *INFORMATION TRANSFER*. More importantly, it reduced the influence of PARTICIPANT ATTRIBUTES on CLINICAL HANDOVER EXPERIENCES, such as *CULTURAL BACKGROUND*, *COMMUNICATION STYLES* and *INDIVIDUAL PERSONALITIES* on CLINICAL HANDOVER EXPERIENCES, especially *INFORMATION TRANSFER*.

CLINICAL HANDOVER EXPERIENCES was affected by all the other core categories. While DEPARTMENTAL REQUIREMENTS and ENVIRONMENTAL CONSIDERATIONS did impact on CLINICAL HANDOVER EXPERIENCES, the strongest relationship lied between IT/IS CONSIDERATIONS and CLINICAL HANDOVER EXPERIENCES. IT/IS CONSIDERATIONS had an impact on CLINICAL HANDOVER EXPERIENCES at departmental, team and individual levels. It also modified the role of other factors on CLINICAL HANDOVER EXPERIENCES. PARTICIPANT ATTRIBUTES for example, play a significantly less important role in determining HANDOVER EXPERIENCE.

7.4 Chapter reflections

This chapter has provided an analysis of the data collected in Phase Three drawing on the principles of grounded theory. Five core categories have emerged from this analysis – DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, CLINICAL HANDOVER EXPERIENCES and IT/IS CONSIDERATIONS. The relationships between the axial codes within each core category and the relationships between core categories were analysed.

The preliminary findings which emerged from this analysis indicated that in the core category of DEPARTMENTAL REQUIREMENTS, *DEPARTMENT TRADITION* no longer had a role to play in influencing clinical handover. *HANDOVER CULTURE* appeared to have been developed after the introduction of the electronic tool and replaced *DEPARTMENT TRADITION*. There had been a change in the understanding of clinical handover from information transfer to continuity of patient care. Multiple factors still influenced clinical handover and clinical handover continued to serve various functions although it had been noted that functions not directly relating to patient care had been marginalised. There were significant challenges associated in the introduction of the electronic tool. While this research introduced the electronic tool only as a support tool based on the user insights obtained, analysis of the data indicated that the use of the electronic tool should be mandatory.

While these findings appeared important within each phase, it was essential in adopting the multi-snapshot approach, to analyse the data throughout the three phases to determine the significance of these findings. Chapter 8 provides an analysis and interpretation of the data across the three phases to draw out the key findings from this research. This is a culmination of the analysis across the three phases of data collection with three different cohorts of participants within the Department of General Internal Medicine. By adopting a multi-snapshot approach and analysing the data across the three phases, the changes in the relationships between the axial codes and core categories can clearly be seen. The integrated analysis of the data across the three phases and an interpretation of the changes are presented in Chapter 8.

Chapter 8 Integrated analysis and interpretation across three phases

8.1 Introduction

This chapter provides an integration of the data analysis conducted separately over the three phases presented in Chapters 4 (Phase One), Chapter 5 (Phase Two) and Chapter 6 (Electronic tool development) and Chapter 7 (Phase Three). This chapter brings together the analysis of the results over the three phases and explores the relationships between the axial codes within a core category and between core categories to detect changes or similarities in the relationships which might have occurred and provides an interpretation as to why those changes occurred.

Key findings that were significant to this research emerged through the analysis and interpretation process conducted across the three phases in this chapter. These key findings will be brought forward and further interpreted and discussed in relation to available literature in Chapter 9. It is important to note that the key findings which emerged can stem from a single axial code, one core category or across core categories.

The next seven sections provide an analysis and interpretation of each of the core categories identified throughout the three phases and highlights the findings which emerged from this process.

- Section 8.2 provides an integrated analysis and interpretation of the core category DEPARTMENTAL REQUIREMENTS across the three phases. The findings which emerged strongly from this core category include: Education and training plays an important role in clinical handover; The clinical handover guidelines and clinical handover manual had an increasing influence on clinical handover throughout the three phases; A clinician's role influences clinical handover; An emergence of handover culture was found in Phase Three and this appeared to replace department tradition which featured strongly in Phases One and Two.
- Section 8.3 provides an integrated analysis and interpretation of the core category PARTICIPANT ATTRIBUTES. The most significant finding from this core category is the strong influence of cultural background and individual personalities on the behaviour of clinicians at clinical handover.
- Section 8.4 provides an integrated analysis and interpretation of the core category ENVIRONMENTAL CONSIDERATIONS. The findings which emerged from this core category include: A clinician's workload is an important consideration as to whether clinical handover occurs and if it does, how it occurs; ENVIRONMENTAL CONSIDERATIONS interact with two other core categories (PARTICIPANT ATTRIBUTES and DEPARTMENTAL REQUIREMENTS) to influence clinical handover in Phases One and Two. In Phase Three, *IT/IS CONSIDERATIONS* added another layer of complexity to the existing interrelationships between the three core categories identified.

- Section 8.5 provides an integrated analysis and interpretation of the core category CLINICAL HANDOVER EXPERIENCES. It appears that clinical handover serves more functions that direct patient care and these functions change from Phases One to Three after the introduction of the electronic tool. Attendance at clinical handover sessions were also found to be very important, especially attendance by consultants as it provides leadership in handover session. Another finding which emerged is the difference between perceived and actual handover, which has a significant impact on clinical handover improvement.
- Section 8.6 provides an integrated analysis and interpretation of the core category USER REQUIREMENTS. Although clinicians had voiced their needs for proper documentation and access of clinical handover notes to facilitate information transfer, a more important finding is that clinicians value face-to-face handover and they see the electronic tool as complementing their current clinical handover processes rather than as a replacement.
- Section 8.7 provides an integrated analysis and interpretation of the core category IT/IS CONSIDERATIONS. The findings which emerged from this core category is that a clinician's knowledge and experience in using IT had the strongest influence on the utilization of the electronic tool. More importantly, it is important to mandate the use of a single tool for clinical handover as otherwise the information contained would be unreliable.
- Section 8.8 provides an integrated analysis and interpretation of the relationships between the core categories which allowed for the emergence of key findings. This includes exploring the multiple layers of complexities in clinical handover, the interaction of factors which influence clinical handover improvement, the use of a user-centred approach in clinical handover improvement, the limitations of using a user-centred approach and the complexities associated with the development and introduction of the electronic tool for clinical handover improvement.
- Section 8.9 provides a summary reflection of the chapter.

8.2 Departmental requirements

The core category DEPARTMENTAL REQUIREMENTS consists of four axial codes (*POLICIES AND GUIDELINES*, *CLINICIAN ROLES*, *EDUCATION AND TRAINING* and *DEPARTMENT TRADITION*) in Phases One and Two and four axial codes (*POLICIES AND GUIDELINES*, *CLINICIAN ROLES*, *EDUCATION AND TRAINING* and *HANDOVER CULTURE*) in Phase Three.

Table 21 illustrates the unilateral relationships between the axial codes in the core category DEPARTMENTAL REQUIREMENTS across the three phases. Cells are marked with a (-) where no relationship was found. This applies to all the tables presented in this chapter.

The axial code	influenced the axial code	Phase One	Phase Two	Phase Three
Policies and guidelines	Clinician roles	Weak	Moderate	Strong
	Education and training	Weak	Moderate	Strong
	Department tradition	-	-	-
	Handover culture(Phase 3)	-	-	Strong
Clinician roles	Education and training	-	-	Strong
	Department tradition	-	-	-
	Policies and guidelines	-	-	-
	Handover culture(Phase 3)	-	-	Strong
Education and training	Department tradition	-	-	-
	Policies and guidelines	-	-	-
	Clinicians roles	-	-	-
	Handover culture(Phase 3)	-	-	Strong
Department tradition (not in Phase 3)	Policies and guidelines	Strong	Strong	-
	Clinician roles	Strong	Strong	-
	Education and training	Strong	Strong	-
Handover culture (Phase 3)	Education and training	-	-	-
	Policies and guidelines	-	-	-
	Clinician roles	-	-	-
		-	-	-

Table 21: Relationships between axial codes across three phases in core category DEPARTMENTAL REQUIREMENTS

8.2.1 Policies and guidelines

In Phases One and Two, the clinical handover guidelines developed at the beginning of 2005 and the clinical handover manual developed in late 2005 did not have much influence on clinical handover and clinical handover improvement as it had minimal influence on the different roles that clinicians of different levels of seniority played and the education and training of clinical handover (see Sections 4.3.1.5 and 5.2.1.5). In Phase Three, this relationship had strengthened significantly resulting in the clinical handover manual and clinical handover guidelines strongly influencing the roles that clinicians play at clinical handover and the education and training delivered on clinical handover which in part led to the development of a culture of clinical handover (see Section 7.2.1.5).

The clinical handover guidelines and the clinical handover manual were developed in 2005 as part of the Department of General Internal Medicine's clinical handover improvement efforts. The clinical handover guidelines were developed by consultants and the clinical handover manual was developed by the clinical handover project registrar. The same clinical handover guidelines and clinical handover manual were used throughout the three phases. A new addition, the user manual for the electronic tool was developed in 2007 to help guide the participants in the use of the electronic tool for clinical handover. It was interesting to note that although there had been no changes made to the pre-existing clinical handover guidelines and clinical handover manual, interns and registrars had moved from not adhering to the clinical handover guidelines and clinical handover in Phase One to using them to guide their practice of clinical handover in Phase Three.

Their growing awareness and use of the clinical handover guidelines and clinical handover manual resulted in a strengthening relationship between Policies and guidelines and Clinician roles over the three phases. As interns and registrars became more familiar with the clinical handover

guidelines and the clinical handover manual, they then had a better understanding of what their role was at clinical handover.

There was also a change in the relationship between *POLICIES AND GUIDELINES* and *EDUCATION AND TRAINING* from a weak relationship in Phase One to a strong relationship in Phase Three. While the clinical handover guidelines were designed to serve also as an educational tool for interns and registrars, the impact that this had on education and training was weak due to the poor adoption of the clinical handover guidelines in Phase One (see Section 4.3.1.1). This relationship had grown stronger in Phase Two as participants who were now aware of the clinical handover guidelines and clinical handover manual indicated that they did learn from them (see Section 5.2.1.1). By Phase Three, most participants were now aware of and adhered to the clinical handover guidelines and clinical handover manual (see Section 7.2.1.1). This contributed to their education and training in clinical handover.

POLICIES AND GUIDELINES also had a strong influence on *HANDOVER CULTURE* in Phase Three as participants had started to recognise the importance of clinical handover with the department having formal documentation in place that provided a proper agenda and structure for clinical handover sessions (see Section 7.2.1.1). This had partially resulted in the emergence of a handover culture that will be discussed in key finding (KF) 3 (see Section 9.2.3).

POLICIES AND GUIDELINES did not have any influence on *DEPARTMENT TRADITION* in Phases One and Two. The influence of *POLICIES AND GUIDELINES* on *DEPARTMENT TRADITION* might have been found if this research was conducted over a longer period of time as it takes time for tradition to change.

The changes in the participants' adherence to the clinical handover guidelines and clinical handover manual across the three phases are interesting to note. The researcher's interpretation of this is that while policies and guidelines have a role to play in clinical handover improvement, they have minimal impact on clinical handover improvement if clinicians are unaware or choose not to adhere to them (which is of a major concern given that clinical handover has been identified as one of the high risk areas in quality and safety in healthcare).

There are a few plausible explanations which can be offered that address the differences seen in regard to *POLICIES AND GUIDELINES* throughout the three phases. Firstly, despite the fact that the clinical handover guidelines and clinical handover manual were said to have been widely disseminated to clinicians in Phases One and Two, interns and registrars seem to be unaware of their existence (although in Phase Two a few participants have acknowledged that they exist). In Phase Three, clinicians were made well aware of the clinical handover guidelines, clinical handover manual and user manual for the use of the electronic tool in their clinical handover training sessions. This had alerted the clinicians to the fact that these documents exist and that they could use them as a reference point if they required guidance on clinical handover. Secondly, the clinical handover guidelines were developed by consultants and the clinical handover manual was developed by the clinical handover project registrar who had a keen interest in clinical handover. There was no involvement by other clinicians, especially interns and registrars in the development of these documents. Thus, it might be the perception of these interns and registrars that these documents were developed by consultants who were not the primary participants in clinical handover and therefore were unfamiliar with how clinical handover was conducted at the

intern and registrar level. In Phase Two, clinicians were involved in the focus groups and design workshops (this included final year medical students as well) to assist in the development of the electronic tool. It was important to note that medical students were involved as they were to be interns working in the department the following year when the electronic tool was being trialled. This gave them a sense of being involved and being a part of clinical improvement efforts initiated within the department. This was important as there was higher likelihood that they would try to ensure that it was successful. Finally, there was also an increasing focus on clinical handover at both the national and international levels within the broader context of quality and safety over the duration of this research and this would have raised the participants' awareness of the importance of clinical handover and how it impacted on patient care leading to them taking measures to ensure that clinical handover was conducted in an appropriate manner. In Phase One, there was very little mentioned about clinical handover within the context of clinicians. In Phase Two however, the Australian Medical Association had published a guide for safe handovers ((Wong *et al.*, 2008, Australian Council for Safety and Quality in Health Care, 2005)) which was distributed to all clinicians in Australia. By Phase Three, the Australian Commission on Quality and Safety had identified clinical handover as a high risk area within quality and safety. There is no doubt that all of these awareness campaigns about clinical handover would have a role in alerting clinicians to the importance of clinical handover within the quality and safety context in patient care.

The preliminary findings identified throughout these three phases are important as when the data is analysed and interpreted across the three phases, it contributes to KF1 (see Section 9.2.1) and has provided answers to RQ1 (see Section 9.3.1).

8.2.2 Clinician roles

It was evident across the three phases that clinicians play different roles in clinical handover based on their seniority. Interns who were the most junior primarily covered more routine tasks, for example, writing up forms and checking test results. Registrars who were more senior needed to assess the patient and formulate investigations and diagnoses and consultants who were the most senior were responsible for the long term care of the patient. As such, an interns' role at handover was task-based whereas a registrar would need to handover the need for reassessment of patients or the need for follow-up investigations and management. A consultant did not usually handover patients as he or she is fully responsible for the care of the patient in the unit. Participants were unsure of their roles in clinical handover in Phases One and Two (see Sections 4.3.1.2 and 5.2.1.3) but it was interesting to note that the participants', particularly the interns', perceptions of their roles had changed quite significantly from Phase One to Phase Three. In Phase One, some interns indicated that they did not have much of a role in clinical handover but by Phase Three (see Section 7.2.1.2), they now thought that they had an important role to play in clinical handover.

It had been recognised that there needed to be a leader at every clinical handover session to ensure that the clinical handover session ran smoothly. While it was stated in the clinical handover guidelines that the role of the leader was to be taken by either the clinical handover project registrar, the post-take consultant or the post-take registrar or the night registrar, it was noted in Phases One and Two (see Section 4.3.1.2 and 5.2.1.3) that it was only in the morning

handover sessions where the consultant who was present took on the leadership role. If the consultant was absent for morning handover, no one took on the leadership role for morning handover. Often, no one took on the leadership role for the other handover sessions unless the clinical handover project registrar was working an after-hours shift in which he would take on the leadership role. It was likely that this was because no one felt that they had adequate knowledge of how to conduct a proper handover session to take on the leadership role or alternatively, it may be that individuals were solely interested in obtaining the information that they required to get on with their work and were not concerned with the smooth running of the clinical handover session. However, it was noted that by Phase Three, some registrars felt confident enough to take on the leadership role during clinical handover (see Section 7.2.1.2).

Participants also have another role at clinical handover which was for the more senior clinicians to provide education and training of clinical handover to the junior clinicians. While it was found that this was virtually non-existent in Phases One and Two, it appeared that in Phase Three, a relationship was established between *CLINICIAN ROLES* and *EDUCATION AND TRAINING* as registrars were now seen to be making an attempt to teach their interns how to handover patients (see Section 7.2.1.2). The researcher's interpretation of this observation was that it appeared to be the joint effect of two things. Firstly, participants have now started to recognise the importance of good handover over the course of this research and secondly, they feel that they are now better equipped to teach their interns how to handover after familiarising themselves with the clinical handover guidelines and having attended clinical handover training sessions.

These findings are very interesting as the change in the interns' perceptions of their role in clinical handover is very important for various reasons. While interns carry out routine tasks to ensure good patient care, their active involvement and understanding of their role as contributing to the continuity in patient care will most definitely contribute to better quality of care for patients. The researcher's interpretation of this is that firstly, the relationship between *POLICIES AND GUIDELINES* had strengthened through the three phases. Their increased use and familiarisation with the clinical handover guidelines possibly contributed to the better understanding of their roles in clinical handover. Secondly, it was also possible that interns who participated in Phase Three of the research (who participated in the development of the electronic tool when they were final year medical students in Phase Two) had familiarised themselves with the concept of clinical handover and the role that it plays over time. Thirdly, it is also possible that the increasing attention paid to clinical handover at the national and international level have made a difference to the practice of clinical handover for interns. Finally, it is also possible that the electronic tool which helped the clinicians conceptualise the meaning of the transfer of responsibility and accountability assisted in the development of a clinical handover culture which is further discussed in KF3 (see Section 9.2.3).

A more likely explanation however is that it is a combination of the above and also there is now a strong leadership in clinical handover sessions. In Phases One and Two, there was minimal evidence of a strong leadership during clinical handover sessions. In Phase Three, there was commonly evidence of leadership during clinical handover sessions. This leadership role is usually taken on by the consultants when they are present at morning handover but in their absence, this role is taken on by registrars who are now more willing to accept the responsibility of ensuring

the smooth running of clinical handover sessions as they now felt more confident in providing education and training to interns about clinical handover. This role modelling and learning on the job is the most important influence on junior clinicians' behaviour during clinical handover as well as in their clinical practice.

This raises questions regarding the role of consultants at clinical handover. In the context of this research, consultants only attended morning handover sessions. This is interesting to note as consultants delegate their responsibility of patient care to registrars and interns but they are responsible for the overall care of the patient even when they are not physically present in the hospital. As a result, one can argue that the only handover session in which a consultant has a role in is the morning handover the day after they are on-take. As consultants are responsible and accountable for all patients admitted under them on a permanent basis, their presence at evening and night handovers could arguably be on to provide a leadership role in the process as opposed to attending the handover sessions for continuity of patient care. In Phase Three, it appears that registrars were able to step up to providing a leadership role in clinical handover and as a result this raises the question of whether the attendance of evening and night handovers by consultants is necessary.

The differences and complexities of the role of clinicians during clinical handover contributed to the overall complexity of clinical handover. This is further discussed in KF1 (see Section 9.2.1) and provides answers to RQ1 (see Section 9.3.1).

8.2.3 Education and training

Analysis of the data through the three phases indicated that there was a lack of formal education and training in clinical handover despite the fact that clinical handover had been identified as being very important in the continuity of patient care by clinicians. Participants had indicated that they have not received any formal education and training in their undergraduate medical training and in their internship year. The lack of formal education and training in clinical handover has likely led to differences in the understanding and practice of clinical handover as well as uncertainties in the role of each participant at clinical handover sessions.

The relationship between *EDUCATION AND TRAINING* and *CLINICIAN ROLES* (see Section 7.1.2.4) was only established in Phase Three. This was probably due to the absence of formal education and training of clinical handover in Phases One and Two. However, with the introduction of the electronic tool in Phase Three, the clinical handover project registrar conducted formal education and training sessions on how to handover patients. This was done in conjunction with the researcher who provided training sessions on how to use the electronic tool. In the education and training sessions, the clinical handover project registrar not only provided teaching on the information to be transferred at handover, he also clearly reinforced the roles each participant had at clinical handover.

Another strong relationship which was only established in Phase Three is the relationship between *EDUCATION AND TRAINING* and *HANDOVER CULTURE* (see Section 7.1.2.4). It was likely that the education and training sessions that were delivered both on clinical handover itself and the use of the electronic tool prior to the introduction of the electronic tool contributed to the development

of a culture of handover by raising awareness and highlighting the importance of clinical handover amongst participants.

From the above, it can be seen that *EDUCATION AND TRAINING* plays a very important role in ensuring that each participant knows what is required of them at clinical handover. Despite the perception of lack of education and training by clinicians, especially interns and registrars, there were a few very important points to note. Firstly, the researcher observed that interns had learnt how to handover patients from their seniors through an “osmosis” process. They modelled what was done and what was said during handover.

Secondly, some registrars had indicated in informal discussions that they lacked the confidence to teach their interns how to handover as they themselves did not know exactly what was deemed the correct way to handover a patient. This finding is concerning. The researcher’s interpretation of this is that clinicians had not had any formal training in clinical handover. More importantly, there were no standards to guide practice for clinical handover and clinicians argued that there was no evidence-based practice in clinical handover, therefore, limiting their willingness to teach handover and to gain confidence in what they do.

Finally, it is important to note that despite the perception that clinicians did not receive formal education and training in clinical handover, when clinical handover training sessions were made available in Phase Three, some clinicians chose not to attend these sessions (see Section 7.2.1.5).

All these findings form significant insights into clinical handover and clinical handover improvement. While education and training was important in clinical handover improvement, developing a particular method to provide education and training is more important than the need to teach clinical handover. The researcher’s interpretation of this is that education and training needs to be provided to clinicians in a way that reflects a standard in practice and in the curriculum such that clinicians feel comfortable and confident that they have achieved the required standard of practice. This is further interpreted and discussed in KF2 (see Section 9.2.2) and provides answers to RQ2 (see Section 9.3.2).

8.2.4 Department tradition

DEPARTMENT TRADITION featured strongly in Phases One and Two and had a strong influence on *POLICIES AND GUIDELINES*, *CLINICIAN ROLES* and *EDUCATION AND TRAINING*. However, analysis of the data obtained from the semi-structured interviews and observations revealed that in Phase Three, *DEPARTMENT TRADITION* had been replaced by the emergence of *HANDOVER CULTURE*.

A strong relationship was established between *DEPARTMENT TRADITION* and *POLICIES AND GUIDELINES* in Phases One and Two (see Sections 4.3.1.4 and 5.2.1.4). It was noted that the clinical handover guidelines that were developed did not deviate much from the way clinical handover was traditionally conducted. This was likely due to the fact that consultants who prepared the clinical handover guidelines, were also the consultants who had been working in the department for the longest duration of time and therefore it was the consultants who formed the department’s tradition.

A strong relationship was also established between *DEPARTMENT TRADITION* and *CLINICIAN ROLES* in Phases One and Two (see Sections 4.3.1.4 and 5.2.1.4). As participants did not have clearly defined roles, a lot of what they did at clinical handover was based on what had always been done previously. For example, apart from the consultants, there appeared to be no one else who could lead the clinical handover sessions and so in the absence of a consultant, no one felt confident enough to step up to the position.

A strong relationship was established between *DEPARTMENT TRADITION* and *EDUCATION AND TRAINING* in Phases One and Two (see Sections 4.3.1.4 and 5.2.1.4). Analysis of the data in Phases One and Two have revealed that there was no emphasis placed on education and training of clinical handover. While participants had indicated that they had not received any formal training in clinical handover, they had not questioned why this was the case and highlighted the need for some training to be conducted.

The researcher's interpretation of the analysis of the data from the axial code *DEPARTMENT TRADITION* is that it is the consultants within the Department that have the strongest influence on the tradition of the department. This is likely due to two reasons. Firstly, the clinical environment is highly hierarchical and consultants are often viewed as the team leader and the person armed with the knowledge and experience to provide patient care. As a result, clinical process improvement strategies often involve consultants as the key decision makers. Junior clinicians very rarely question the way things are done within this traditional hierarchical environment because that is the way things have always been done leading to tradition that has been set by a few consultants being followed and not questioned over time. This is evident in the fact that the clinical handover guidelines were developed by the consultants even though they impact mainly on the registrars' and interns' practice of clinical handover. Secondly, it was also clear from this research that registrars and interns only work in the department for a limited period of time. Interns are usually only with the department for eight weeks at a time and registrars are usually there for a year or two. Given these circumstances, the clinical handover improvement efforts really need to be driven by the consultants who are the long-term staff in the department. The consultants have established a set way of how clinical practice is delivered and the interns and registrars assist in the process. This hierarchical environment dictates how clinical handover was to be conducted and the different cohorts of interns and registrars rotating through the department on a temporary basis did not question the way things were done and merely followed what was usually done in the department for clinical handover.

It is interesting to note that *DEPARTMENT TRADITION* had been replaced by the emergence of *HANDOVER CULTURE* in Phase Three. There are a few likely explanations for this occurrence. Firstly, it appears that the education and training sessions provided as part of the introduction of the electronic tool and the actual use of the electronic tool itself influenced the participants' clinical handover practice and contributed to the development of a culture of handover. Secondly, registrars stepping up to take on the leadership role in the absence of a consultant (see Section 7.2.1.4) might have also contributed to the culture of clinical handover. However, it is the researcher's belief that it was the constant focus placed on involving interns and registrars in this research and in assisting with the development of the electronic tool that contributed to the emergence of a handover culture.

While these preliminary findings are important, interesting findings emerged when the data was interpreted across core categories. A relationship was established between *DEPARTMENTAL REQUIREMENTS* and *USER REQUIREMENTS*. This contributes to KF3 (see Section 9.2.3) and provides answers to RQ2 (see Section 9.3.2).

8.2.5 Handover culture

HANDOVER CULTURE was an axial code that only emerged in Phase Three and was influenced strongly by *POLICIES AND GUIDELINES*, *EDUCATION AND TRAINING* and *CLINICIAN ROLES* (see Section 7.2.1.4). This indicates that the development of a culture of clinical handover can only be achieved over time and through the use of a combination of multiple clinical handover improvement strategies.

The researcher's interpretation of this is that it was likely that the culture for clinical handover had developed progressively over the duration of this research. There are several possible explanations as to the emergence of *HANDOVER CULTURE* in Phase Three which had interestingly replaced *DEPARTMENT TRADITION* which featured strongly in Phases One and Two. Firstly, the increased publicity associated with clinical handover as being an importance part of clinical practice within the Royal Hobart Hospital and also at a national and international level would have led to the participants recognising the importance of clinical handover. Secondly, the education and training sessions on clinical handover which were held in conjunction with the training sessions on how to use the electronic tool for clinical handover would also have played a part in increasing the clinicians' awareness of the importance of clinical handover and also improved their clinical handover practice which in part led to the emergence of a culture of clinical handover. More importantly, it is the researcher's belief that it was through involving the different cohorts of clinicians through the three phases of this research that provided them with opportunities to self-reflect on their clinical handover practice and alter their practice where problems were identified that had a major role to play in the emergence of a culture of clinical handover. It therefore seems very plausible that the over-arching user-centred approach used in this research contributed significantly to the development of a culture of clinical handover in the department. The researcher is hopeful that this handover culture will continue even when this research ends.

The emergence of a culture of clinical handover is a significant finding in this core category but the significance of this needs to be interpreted with other axial codes in other core categories. Although the data from the participants revealed the emergence of *HANDOVER CULTURE* which has replaced *DEPARTMENT TRADITION*, interpretation of the data across core categories has raised questions regarding this. This contributes to KF3 (see Section 9.2.3) provides answers to RQ2 (see Section 9.3.2).

8.3 Participant attributes

The core category *PARTICIPANT ATTRIBUTES* consists of six axial codes (*UNDERSTANDING*, *EXPECTATIONS*, *INDIVIDUAL PERSONALITIES*, *COMMUNICATION STYLES*, *CULTURAL BACKGROUND* and *BEHAVIOUR*) throughout the three phases.

Table 22 shows the relationships between the axial codes in the core category PARTICIPANT ATTRIBUTES across the three phases.

The axial code	influenced the axial code	Phase One	Phase Two	Phase Three
Understanding	Expectations	Strong	Strong	Strong
	Individual personalities	-	-	-
	Communication styles	-	Strong	Moderate
	Cultural background	-	-	-
	Behaviour	Strong	Strong	Moderate
Expectations	Individual personalities	-	-	-
	Communication styles	-	-	-
	Cultural background	-	-	-
	Behaviour	Strong	Strong	Strong
	Understanding	-	-	-
Individual personalities	Communication styles	Strong	Strong	Moderate
	Cultural background	-	-	-
	Behaviour	Strong	Moderate	Strong
	Understanding	-	-	-
	Expectations	Moderate	Moderate	-
Communication styles	Cultural background	-	-	-
	Behaviour	Strong	Strong	Strong
	Understanding	-	-	-
	Expectations	-	-	-
	Individual personalities	-	-	-
Cultural background	Behaviour	Strong	Strong	Strong
	Understanding	Strong	Strong	Strong
	Expectations	Strong	Strong	Strong
	Individual personalities	-	-	-
	Communication styles	Strong	Strong	Strong
Behaviour	Understanding	-	-	-
	Expectations	-	-	-
	Individual personalities	-	-	-
	Communication styles	-	-	-
	Cultural background	-	-	-

Table 22: Relationships between axial codes across three phases in the core category PARTICIPANT ATTRIBUTES.

8.3.1 Understanding

The most significant finding within this axial code across the three phases is the evolving nature of the understanding of clinical handover and the differences identified amongst clinicians with regards to what constitutes clinical handover.

The participants' understanding of clinical handover had changed over the duration of this research. In Phase One, it was found that there were significant differences in the understanding of what clinical handover constituted and this mostly corresponded with the participants' role in patient care (see Section 4.3.2.7). However, CON J did appear to have a more narrow view of handover than the other consultants who believed that handover should encompass a variety of things including the transfer of patient care and some form of teaching to junior clinicians. Most registrars and interns however believed that handover was mainly a process of information transfer. Phase Two data provided significantly more depth to the understanding of clinical handover. While the understanding of what needed to happen and what actually happened at handover was different amongst participants, Phase Two data had provided some common ground which guided clinical handover amongst participants (see Section 5.2.2.7). While it was

true that registrars wanted to obtain a clear understanding of the patient that they had to attend to during their shift and that interns were concerned with obtaining a task list that needed completing during their shift, this demonstrated a continuity in the role that they played in their respective teams in patient care. By Phase Three, there had been a shift in the understanding of clinical handover from pure information transfer to that of continuity of patient care (see Section 7.2.2.7). While interns and registrars continued to differ in their understanding of handover in regard to information transfer, they now defined that the purpose of transferring that information was to ensure continuity of patient care. While the electronic clinical handover support tool assisted in the transfer of information, interns and registrars still found the need to have meetings face-to-face to discuss patient care, in order to transfer responsibility of care.

UNDERSTANDING had a strong influence on *EXPECTATIONS* and this was evident in all three phases. This was not surprising as it was noted that when the participants' understanding of clinical handover changed, their expectations of clinical handover changed too.

UNDERSTANDING had a strong influence on *COMMUNICATION STYLES* in Phase Two and a moderate influence on *COMMUNICATION STYLES* in Phase Three. This relationship only emerged in Phase Two during focus group discussions about clinical handover. Participants had indicated different ways in which they would like communication to take place during clinical handover and had justified this through their own understanding of clinical handover. This relationship also became obvious in the design workshops when participants of different seniorities were put together. Participants debated about what should be said and how it should be presented at clinical handover sessions and their understanding of clinical handover and their role in patient care and at clinical handover helped determine that. Registrars emphasised the need to discuss the rationale behind the decision made for a patient and needed more detailed information whereas interns only wanted a concise summary of what needed to be done. In Phase Three, the strong influence between *UNDERSTANDING* and *COMMUNICATION STYLES* weakened as there was an increased uniformity in the understanding of clinical handover and this weakened the influence it had on *COMMUNICATIONS STYLES*. *COMMUNICATION STYLES* had also been streamlined with the introduction of the electronic tool.

UNDERSTANDING had a strong influence on *BEHAVIOUR* and this was evident in all three phases. It was found that as the participants' understanding of clinical handover changed, their behaviour at clinical handover changed as well (see Sections 4.3.2.1, 5.2.2.1, 7.2.2.1). A significant finding when analysing and interpreting the data throughout the three phases together is the fact that the understanding of clinical handover forms the foundation for clinical handover practice. While different participants have a different understanding of clinical handover, there is a consensus as to the fundamental concept of clinical handover which has been demonstrated in Phase Three (see 7.2.2.1).

The researcher's interpretation of the differences in the understanding of clinical handover as well as the evolving change in that understanding is that it is due to a combination of several factors working together. Firstly at the contextual level, clinical handover had not received much attention until the past few years within the Department of General Internal Medicine as well as both nationally and internationally especially in Phases One and Two of this research. In Phase

Three, the awareness of clinical handover what clinical handover constituted was better understood amongst participants as a result of departmental efforts and external clinical handover initiatives.

Secondly, the education and training of participants through formal education and training sessions, but also informally during handover sessions made a difference. Registrars were often observed educating their interns in the practice of clinical handover in Phase Three (see Section 7.2.1.3).

Finally and more importantly, the ongoing process of engaging participants in the debate and understanding of clinical handover through this research contributed to the improved understanding and expectations of clinical handover. Participants were found to be adhering to the clinical handover guidelines and clinical handover manual more closely in Phase Three (see Section 7.2.1.1) and this could either be due to the fact that it took a certain amount of time for the participants to familiarise themselves with the clinical handover guidelines and clinical handover manual or due to the fact that actively involving the participants in the data collection process and the development of the electronic tool developed a consensus in regard to the understanding of handover amongst participants. The power of self-reflection and reflective practice amongst clinicians was essential and the process of engaging clinicians in the discussions of clinical handover improvement, most likely stimulated self-reflection and therefore changed their understanding of clinical handover.

It can therefore be argued that participants had a different understanding of clinical handover and this understanding of clinical handover evolved over the three phase. An improved understanding of clinical handover can be developed and refined through the use of policies and guidelines and education and training but it appears that the process of self-reflection is the most useful.

This research has shown that the user-centred approach used allowed for participants to examine their own understanding of clinical handover and this understanding had evolved through their involvement in this research which in turn helped in clinical handover improvement. The differences in understanding and the evolving nature in the understanding of clinical handover forms KF4 (see Section 9.2.4) and contributes to KF1 (see Section 9.2.1). This contributes to answering RQ1 (see Section 9.3.1) and RQ2 (see Section 9.3.2).

8.3.2 Expectations

Expectations of clinical handover changed over the three phases as the participants' understanding of clinical handover changed. Over the three phases, however, the relationship between *EXPECTATIONS* and all other axial codes remained the same.

EXPECTATIONS strongly influenced *BEHAVIOUR* throughout the three phases. *EXPECTATIONS* did not have any influence on *INDIVIDUAL PERSONALITIES*, *CULTURAL BACKGROUND* and *UNDERSTANDING*.

It is interesting to note that different participants had different expectations in regard to what will be done at clinical handover but their expectations of information transfer was similar. All consultants expected to receive a good transfer of patient information regardless of whether they

participated in clinical handover sessions to ensure this outcome (e.g. CON J never attended clinical handover sessions but expected that his registrar obtain the relevant information during morning handover and present the information to him).

What is more significant however is the fact that *EXPECTATIONS* not only refers to a participant's individual expectations of themselves which in turn affected their own behaviour during clinical handover but also encompasses their expectations of others during clinical handover which affected the other participants' behaviour and their own behaviour at handover. This was particularly evident with regards to the expectations of more senior clinicians influencing the behaviour of more junior clinicians at clinical handover. This reflects the strong hierarchical nature of clinical practice and illustrates the power relationships at play which will be discussed in Section 9.2.10.

From the above, it can be seen that *EXPECTATIONS* is very important in influencing *BEHAVIOUR*. More importantly, it is the expectations of the senior clinicians that strongly influence the behaviours of junior clinicians. This contributes to KF1 (see Section 9.2.1) and KF4 (see Section 9.2.4) and provides answers to RQ2 (see Section 9.3.2).

8.3.3 Individual personalities

Participants had very different personalities and this had strong influence on clinical handover. Personalities include leadership, characteristics, qualities and attitudes. For example, it was observed that some participants had leadership qualities and other participants looked up to them at both a professional and at a personal level. Some participants had a very good work attitude although they lacked leadership qualities. These participants contributed to handover in their own way.

INDIVIDUAL PERSONALITIES strongly influenced *COMMUNICATION STYLES* in Phases One and Two and only moderately influenced *COMMUNICATION STYLES* in Phase Three. This strong influence was evident in Phases One and Two where clinical handover sessions were conducted verbally during face-to-face meetings. It was found that junior clinicians tried to change their behaviour according to their senior counterparts (see Section 4.3.2.4). However, this relationship weakened in Phase Three after the introduction of the electronic tool as participants were now able to enter the information into the electronic tool which had a set structure. Therefore, participants now had an alternative way to obtain information and not be totally reliant on face-to-face meetings.

INDIVIDUAL PERSONALITIES had a moderate influence on *EXPECTATIONS* in Phases One and Two (see Sections 4.3.2.2 and 5.2.2.2), but had no influence on *EXPECTATIONS* in Phase Three. This was perhaps due to the increasing understanding of clinical handover among participants and therefore the more uniform expectations on clinical handover mitigate the influence of Individual personalities.

The influence of *INDIVIDUAL PERSONALITIES* on *BEHAVIOUR* varied across the three phases. There was a strong relationship established in Phases One and Three (see Sections 4.3.2.3 and 7.2.2.3) but only a moderate relationship established in Phase Two (see Section 5.2.2.3). It is the researcher's belief that this was due to the different data collection methods used in Phase Two which relied solely on information provided by the participants in focus groups rather than a combination of

data collection methods used in Phases One and Three which involved semi-structured interviews, observations and compilation of clinical handover notes. This illustrates the fact that there are indeed differences between perceived handover and actual handover. It is likely that participants unwittingly did not give a true account of what they and other participants did at clinical handover and therefore in circumstances like these, observation data provides better insights into the relationship.

A significant finding emerged when analysing and interpreting the axial codes across three phases together with the core category ENVIRONMENTAL CONSIDERATIONS. The inter-relationships between the factors that affect clinical handover and their intricacies are described in KF6 (see Section 9.2.6) and provide answers to RQ2 (see Section 9.3.2).

8.3.4 Communication styles

Participants had different communication styles. Some participants were short and concise while others tended to provide a lot more detail at clinical handover sessions.

COMMUNICATION STYLES strongly influenced *BEHAVIOUR* at clinical handover throughout the three phases (see Sections 4.3.2.4, 5.2.2.4, 7.2.2.4). This was interesting as one would have thought that the introduction of the electronic tool in Phase Three which was supposed to help structure the information presented at clinical handover would result in a more standardised method for information transfer leading to a weaker relationship between *COMMUNICATION STYLES* and *BEHAVIOUR*. However, it was found in Phase Three that participants would still request for information based on what they felt was needed to obtain a proper handover.

COMMUNICATION STYLES did not have any influence on *CULTURAL BACKGROUND*, *UNDERSTANDING*, *EXPECTATIONS* and *INDIVIDUAL PERSONALITIES* throughout the three phases.

From the above, it can be seen that while participants had different ways of communicating and it might be worth attempting to streamline their communication styles through the introduction of some structure, it was still a significant consideration in face-to-face handover. Analysing and interpreting this across the three phases and its relationships with axial codes in other core categories formed KF6. This is further interpreted and discussed in Section 9.2.6 and provides answers to RQ2 (see Section 9.3.2).

8.3.5 Cultural background

CULTURAL BACKGROUND featured strongly in this core category throughout the three phases with strong influences on *UNDERSTANDING*, *EXPECTATIONS*, *COMMUNICATION STYLES*, and *BEHAVIOUR* despite the ongoing clinical handover improvement efforts initiated at the departmental level and increasing awareness of the importance of clinical handover at the national and international level.

CULTURAL BACKGROUND had a strong influence on *BEHAVIOUR*. It was observed in Phase One that cultural background not only influenced the behaviour of the individual participant but also that of other participants at clinical handover (see Section 4.3.2.5). The participant with a different cultural background was less likely to participate actively and clinical handover and this poses a problem in clinical handover improvement initiatives. This was again evident in Phase Two (see

Section 5.2.2.5) whereby this group of participants tended not to participate actively in the focus groups and design workshops and unfortunately when they did, their comments were not taken seriously by others. Although the introduction of the electronic tool in Phase Three meant that participants were able to enter the data into the electronic tool and other participants could then retrieve that information if needed, the influence of *CULTURAL BACKGROUND* on *BEHAVIOUR* remained strong (see Section 7.2.2.5) as participants still had to attend face-to-face clinical handover sessions.

CULTURAL BACKGROUND also had a strong influence on *UNDERSTANDING*, *EXPECTATIONS* and *COMMUNICATION STYLES* across all three phases (see Sections 4.3.2.5, 5.2.2.5, 7.2.2.5). It appears that education and training, an increased awareness of clinical handover at the departmental and national level had not made any difference to the strong influence of cultural background. More importantly, the influence of cultural background was not only on a participant's own expectations and communication styles but also that of other participants during clinical handover.

This finding is extremely important for clinical handover and clinical handover improvement. What appears more important is the fact that despite the strong influence of cultural background on clinical handover, clinicians barely mentioned this in their interviews.

Due to the differences in the understanding of clinical handover, participants also had different expectations of clinical handover. In addition, it appeared that participants from a certain cultural background had a stronger belief in clinical autonomy and therefore did not view clinical handover as an important part of clinical practice. *CULTURAL BACKGROUND* appeared to be a rather sensitive issue that was only highlighted by the Head of Department as a potential contributor to clinical handover improvement and even then chose the words very carefully to imply that a certain group of clinicians from a different cultural background did have difficulties in communicating and that their expectations of clinical handover were different.

The researcher's interpretation of the differences in understanding, expectation and communication styles during clinical handover of participants of different cultural background is that it is likely due to a combination of factors. As many participants with different cultural backgrounds would have joined the department for only a short period of time on temporary work visa from other countries, they might not have been familiarised with the changing in contextual landscape of clinical handover in Australia. Secondly, this observation could also be due to the fact that different countries practiced clinical handover differently or that their education on clinical handover was different to that from Australian graduates. Finally, it could be due to the fact that clinicians from culturally different background have different understanding of how they should express themselves in a group setting and therefore it significantly influenced their ability to communicate in face-to-face handover.

This finding contributes to KF5 (see Section 9.2.5) and KF6 (see Section 9.2.6) and provided answers to RQ2 (see Section 9.3.2).

8.3.6 Behaviour

BEHAVIOUR was influenced by *UNDERSTANDING*, *EXPECTATIONS*, *INDIVIDUAL PERSONALITIES*, *COMMUNICATION STYLES* and *CULTURAL BACKGROUND* in varying degrees through the phases, which were described above. It is important to note that *BEHAVIOUR* of one participant had a strong influence on *BEHAVIOUR* of other participants. This is especially the case that the behaviour of senior clinicians strongly influences behaviour of junior clinicians.

BEHAVIOUR of a participant is therefore a product of the influences of *UNDERSTANDING*, *EXPECTATIONS*, *COMMUNICATION STYLES*, *CULTURAL BACKGROUND*, *INDIVIDUAL PERSONALITIES* and *BEHAVIOUR* of others during clinical handover. As such, a user-centred approach that allows for participants to understand their own actions as well as provide an opportunity for them to self-reflect serve as an important role for clinical handover improvement.

The relationship between the axial code *BEHAVIOUR* in this core category and the axial code *TEAM DYNAMICS* in the core category ENVIRONMENTAL CONSIDERATIONS had a significant influence on clinical handover and this contributes to KF6 (see Section 9.2.6) and provides answers to RQ2 (see Section 9.3.2).

8.4 Environmental considerations

The core category ENVIRONMENTAL CONSIDERATIONS consists of five axial codes (Workload, Venue, Distractions, Number of participants, and Team dynamics) in Phases One and Two and six axial codes (Workload, Venue, Distractions, Number of participants, Team dynamics and IT infrastructure) in Phase Three.

Table 23 shows the relationships between the axial codes in the core category ENVIRONMENTAL CONSIDERATIONS.

The axial code	influenced the axial code	Phase One	Phase Two	Phase Three
Workload	Venue	Strong	Strong	-
	Distractions	Moderate	-	-
	Number of participants	-	-	-
	Team dynamics	Moderate	Strong	Moderate
	IT infrastructure	-	-	-
Venue	Distractions	Strong	Strong	Strong
	Number of participants	-	-	-
	Team dynamics	Moderate	Moderate	Strong
	Workload	-	-	-
	IT infrastructure	-	-	Strong
Distractions	Number of participants	-	-	-
	Team dynamics	Strong	Strong	Strong
	Workload	-	-	Strong
	Venue	-	-	-
	IT infrastructure	-	-	-
Number of participants	Team dynamics	Moderate	Moderate	-
	Workload	-	-	-
	Venue	Moderate	Moderate	-
	Distractions	Moderate	Moderate	-
	IT infrastructure	-	-	-
Team dynamics	Workload	-	-	-
	Venue	-	-	-
	Distractions	-	-	-
	Number of participants	-	-	-
IT infrastructure	Workload	-	-	Strong
	Venue	-	-	Strong
	Distractions	-	-	Strong
	Number of participants	-	-	-
	Team dynamics	-	-	Strong

Table 23: Relationships between axial codes across three phases in the core category ENVIRONMENTAL CONSIDERATIONS.

8.4.1 Workload

WORKLOAD appeared to have a significant influence on *TEAM DYNAMICS* but this influence seemed to weaken in Phase Three (see Table 23). It is important to note that the introduction of the electronic tool in Phase Three actually increased the intern's workload who had to enter the clinical handover information into the electronic tool. With the introduction of the electronic tool, interns have had to better prepare themselves for handover as use of the electronic tool required them to physically locate a computer to type in the required information. Interns also found that they were provided with more information about the patients when they received a handover. It is also noted that while this was taking longer to do than manually writing down handover notes, in time this will be quicker as interns get used to using the electronic tool.

WORKLOAD had a strong influence on *VENUE* in Phases One and Two (see Sections 4.3.3.1 and 5.2.3.1) but had no influence in Phase Three after the introduction of the electronic tool. In Phases One and Two, it was observed that if there was a heavy workload during that shift, clinical handover was conducted somewhere other than the designated handover room. This was due to the fact that not every participant would be present at handover time and often members of the

incoming team would attempt to locate members of the outgoing team through their pagers and handover would be conducted in an area that was convenient, for example, in the clinical areas or the corridors. This changed in Phase Three because the introduction of the electronic tool meant that clinical handover had to be conducted in an area where there were computers available and the clinical handover room was usually the place where clinical handover was conducted.

WORKLOAD was also found to have a strong influence on *DISTRACTIONS* in Phase One (see Section 4.3.3.1) but that did not emerge again in Phases Two and Three. This was interesting because only one participant in Phase One indicated that *WORKLOAD* could be a source of distraction as she was eager to get on with her work and did not pay that much attention to clinical handover. One would have thought that clinical handover became even more important with a heavier workload as it would help in providing the participant with an overall assessment of how many patients would have to be seen and who were the sick ones that needed to be seen first.

WORKLOAD also had a strong influence on *TEAM DYNAMICS* in Phases One and Two but this influence weakened in Phase Three after the introduction of the electronic tool. In Phases One and Two, it was found that if there was a heavy workload and participants were unable to attend or were called away during clinical handover, it affected how well the team worked together (see Section 4.3.3.1 and Section 5.2.3.1). In Phase Three however, the influence of *WORKLOAD* on *TEAM DYNAMICS* was weakened as participants were able to obtain information on the electronic tool and this information was usually more complete than information that was scribbled on little pieces of paper. They were then able to contact one another if needed based on the information that they had on hand.

The influence of *WORKLOAD* on clinical handover is very interesting from the view of patient safety. Participants indicated that when the workload was heavy, they did not have time for a proper handover. This was interesting as it would seem that clinical handover would be much more important at times when there was a heavy workload to ensure that all patients requiring care were attended to. Workload should theoretically be similar for participants working in the same shift but it appears that some participants have the ability to better manage their time and attend clinical handover while others did not. Many participants have indicated that they would rather finish their jobs on the ward than handover the tasks to the next shift. Some participants were even observed to return to the wards to complete certain tasks after handing over.

The researcher's interpretation of this axial code and these interesting observations is that *WORKLOAD* is one environmental factor beyond the participants' control. However it has influence on other environmental factors that influence *TEAM DYNAMICS* during clinical handover. Participants deal with workload by trying to finish as much as they can so that they handover a workload that is manageable to the next team instead of handing over all the work. This could be explained by a few reasons. Firstly, participants are dedicated to their jobs and want to complete as much as they can in their shift. Secondly, participants are not comfortable in handing over tasks to the next shift either due to the fact that they do not want to add to their colleague's workload or they are not confident that the task will be carried out. Finally, while participants cannot control their workload, they can see the consequence of a heavy workload on the next team and therefore attempt to complete the work instead of attending clinical handover.

This finding together with other findings in the core category of PARTICIPANT ATTRIBUTES contributes to the conceptual understanding of the impact of various factors on clinical handover which forms KF6 (see Section 9.2.6) and provides answers to RQ2 (see Section 9.3.2)

This is interesting from a quality and safety perspective as while on one hand a good handover will improve patient care but on the other hand clinicians stay back in the wards to complete the tasks required of them instead of attending clinical handover either because they are dedicated, worried that their tasks will not be completed by the next team or the workload of the next team is not manageable to provide good patient care. The impact of this in the broader context of quality and safety is complex

8.4.2 Venue

There were significant changes to the relationship between *VENUE* and *TEAM DYNAMICS* and *VENUE* and *IT INFRASTRUCTURE AND SUPPORT* in Phase Three. The electronic tool dictated that now clinical handover sessions were conducted in the clinical handover room in Phase Three and this had a significant influence on Team dynamics.

A description of the clinical handover room has been provided in Section 4.3.3.2. This room was situated close to the participants' lockers which meant that it was convenient for them when they arrived in the mornings. It was also situated away from the clinical work area which was important in minimising disruptions. This was the same room used throughout the three phases. However, participants had indicated that the venue for clinical handover was actually changed in between Phase One and Phase Two data collection. The researcher was told that the Department changed the venue to a larger room closer to the clinical work area. This was because the Department wanted other allied health staff to participate in clinical handover and there was not enough room in the original designated clinical handover room. The researcher was also told that the change in venue only lasted a week due to strong objections from the participants.

VENUE strongly influenced *DISTRACTIONS* in Phases One and Two (see Sections 4.3.3.2 and 5.2.3.2). However, while observation sessions revealed that there were still multiple distractions in Phase Three, participants did not highlight these in the interviews. This could be due to the fact that participants were not bothered by these distractions or that they had gotten used to these distractions and accepted that it was part of their work environment.

VENUE moderately influenced *TEAM DYNAMICS* in Phases One and Two. In Phase One, while the researcher observed that the seating arrangement in the room facilitated discussions between the two teams, participants seemed unaware of that. In Phase Two, participants seemed to be more aware of the influence of *VENUE* on *TEAM DYNAMICS* with some participants indicating that when clinical handover was held in the designated room, there were better discussions on how to divide jobs and it occurred in other areas, interns and registrars would not normally have discussions together. In Phase Three, the influence of *VENUE* on *TEAM DYNAMICS* became stronger due to the fact that the clinical handover information entered into the electronic tool was now projected onto the screen and given the layout of the room, any participant who arrived late caused disruptions to the handover session.

VENUE did not have any influence on *NUMBER OF PARTICIPANTS* and *WORKLOAD*.

The researcher's interpretation of this axial code based on analysis of the data across the three phases is that the venue chosen for clinical handover should be done in consultation with the participants in order to ensure that the room met their needs and had minimal distractions. However, focusing on minimising the distractions that bothered the participants were more important than trying to minimise all distractions. More importantly, the introduction of the electronic tool seemed to have a strong influence on venue as the venue chosen for clinical handover would need to contain desktop terminals and a printer. This finding contributes to KF6 (see Section 9.2.6) and provides answers to RQ2 (see Section 9.3.2).

8.4.3 Distractions

DISTRACTIONS is an important axial code and it appears that there has been a change in distractions from Phases One to Two. Data analysis in Phase One identified both internal and external distractions (see Section 4.3.3.6). External distractions beyond the participants' control seem to bother the participants more but internal distractions appear to have more of an impact on clinical handover. There appears to be less distractions in Phase Two (see Section 5.2.3.6) and in Phase three while some distractions had been minimised the electronic tool seemed to be the source of a new distraction (see Section 7.2.3.6). It is important however to note that there were observation sessions conducted in Phase Two and this might therefore reflect less distractions as participants were unaware of some of the distractions.

DISTRACTIONS strongly influenced *TEAM DYNAMICS* in Phases One (see Section 4.3.3.3) and Two (see Section 5.2.3.3). It was interesting to note that external distractions appeared to have less influence on *TEAM DYNAMICS* in Phase Three (see Section 7.2.3.3). This might be due to the fact that a team member can provide handover information through the electronic tool and therefore there is less distraction of trying to obtain printed or written information from the outgoing team. When clinicians did use the electronic tool during handover, however, that appeared to be a new distraction. The external distractions were also less frequent and this might explain reducing the influence of *DISTRACTIONS* on *TEAM DYNAMICS*.

DISTRACTIONS did not have any influence on *WORKLOAD*, *VENUE* and *IT INFRASTRUCTURE AND SUPPORT* throughout the three phases.

While analysis of the data has revealed the different types of distractions which impact on clinical handover and should be considered in clinical handover improvement, what is more important is the fact that while many distractions were observed as impacting on clinical handover, participants did not appear to be aware of some of these distractions. It was interesting to note that many of the distractions observed were actually created by the participants themselves – eating breakfast, printing patient lists, making jokes etc. However, participants did not highlight these distractions as impacting on clinical handover. Instead they highlighted being paged during clinical handover as a major source of distraction.

While minimising distractions is one way in improving clinical handover, it would be more important to focus on distractions which actually bother the participants at clinical handover. Participants do not appear to be affected by distractions that they themselves had created. This is interesting and should be taken note of as attempts made at reducing these distractions might disengage participants from the clinical handover improvement process.

This raises two important points. Firstly, it appears that participants are more sensitive to distractions that fall outside their control. Secondly, there appears to be a lack of recognition of the importance of clinical handover amongst other staff in the hospital. This further validates and contributes to the conceptual understanding described in KF6 which is elaborated and discussed in KF 6 (See Section 9.2.6) and provided answers to RQ2 (see Section 9.3.2).

8.4.4 Number of participants

The number of participants varied in clinical handover sessions held at different times of the day. Morning handover had the highest number of participants and night handover had the least number of participants. While this trend remained similar throughout the three phases, *NUMBER OF PARTICIPANTS* no longer influenced *TEAM DYNAMICS*, due to the constraints placed by the electronic tool on number of participants during clinical handover as they usually gathered around the desktop terminal. Secondly, participants now had a choice of obtaining information from the electronic tool if they found it difficult to participate at handover sessions. However, it was likely that relying fully on the electronic tool and not attending clinical handover sessions might impact negatively on *EDUCATION AND TRAINING* and *TEAM DYNAMICS*.

This axial code has revealed some interesting findings. *NUMBER OF PARTICIPANTS* moderately influenced *TEAM DYNAMICS* in Phases One (see Section 4.3.3.4) and Two (see Section 5.2.3.4). In Phase One, the number of participants present had a significant impact on team dynamics and clinical handover. Firstly, attendance at handover by staff who have a relevant role to play such as specialty registrars is often viewed as having a positive impact on team dynamics. This often means that the team does not need to specifically locate the specialty registrar to handover the information separately. Secondly, the team likes to have all team members present at handover sessions so that everyone has a clear idea of what is going on and no information is missed. Thirdly, the presence of staff or students who do not have an active role in patient care is seen as disruptive and acts as a distraction as the room is small and does not allow for everyone to be seated properly and conduct handover in a way that everyone can hear what is said and participate appropriately. In Phase Two (see Section 5.2.3.4), it was interesting to note that participants prefer to restrict the handover sessions to only medical staff. The department had attempted to involve other healthcare professional who were also involved in patient care at handover sessions. However, this was unsuccessful. The researcher's interpretation of this is that participants need to have an active role to play in patient care and many of the cases presented at clinical handover will be somewhat relevant to them in the process of transferring responsibility and accountability of patient care. As other healthcare professionals did not actively participate in handover and were not involved in many of the cases, their presence did not contribute to improving the team dynamics of clinicians looking after the patients during and after the clinical handover sessions. This should be considered in future multi-disciplinary handover initiatives.

NUMBER OF PARTICIPANTS moderately influenced *VENUE* in Phases One (see Section 4.3.3.4) and Two (see Section 5.2.3.4). The designated clinical handover room was usually used in the morning to accommodate the large number of participants however, when there were fewer participants involved in the evening and night handovers, handover tended to occur elsewhere. In Phase Three, however, most handovers occurred in the clinical handover room in front of a computer.

Number of participants moderately influenced Distractions in Phases One (see Section 4.3.3.4) and Two (see Section 5.2.3.4). It was observed that there were more distractions when there were more participants present at handover. The distractions were often caused when participants got bored because they did not think that the information presented was relevant to them and proceeded to do something else in the clinical handover room.

NUMBER OF PARTICIPANTS did not have any influence on *WORKLOAD* and *IT INFRASTRUCTURE AND SUPPORT*.

The relationship between this core category and core category *PARTICIPANT ATTRIBUTES* contributes to KF6 (see Section 9.2.6) and provides answers to RQ2 (see Section 9.3.2).

8.4.5 IT infrastructure and support

IT infrastructure and support was an axial code that only emerged in Phase Three with the introduction of the electronic tool.

IT INFRASTRUCTURE AND SUPPORT strongly influenced *WORKLOAD* (see Section 7.2.3.4). The lack of available computers on the ward meant that participants often had to stay behind after their shift to key in the information into the electronic tool. Another point which had not been brought up by the participants could be that they were too busy during their shift to sit down and key in the clinical handover information or that they were not used to using the electronic tool on the go. There, it might appear that *IT INFRASTRUCTURE AND SUPPORT* influenced *WORKLOAD* significantly.

IT INFRASTRUCTURE AND SUPPORT strongly influenced *VENUE* (see Section 7.2.3.4). This might be a positive thing as because of the participants' reliance on the computers and printer in the designated clinical handover room, clinical handovers now occurred mostly in the designated room.

IT INFRASTRUCTURE AND SUPPORT also strongly influenced *DISTRACTIONS* (see Section 7.2.3.4). This was extremely frustrating as the electronic tool was designed to assist the participants with clinical handover and not create more distractions for them during clinical handover. Participants however indicated that the lack of adequate IT infrastructure and support caused significant distractions as they attempted to address the problems e.g. replenish printing paper, rather than pay attention at clinical handover.

IT INFRASTRUCTURE AND SUPPORT strongly influenced *TEAM DYNAMICS* (see Section 7.2.3.4). This was interesting as the introduction of the electronic tool resulted in the participants looking at the overhead projector screen at the front of the room rather than at each other and this strongly influenced Team dynamics.

An important insight from this axial code was that a good IT infrastructure and support was important in supporting the use of the electronic tool. Both the hardware and software require regular maintenance. While participants indicated that trialling and electronic tool was a way forward in improving clinical handover in Phase Two, it was a concern that participants now indicated that there were insufficient computers and desk space in the wards for them to enter the handover information as they attended to each patient which was the way the tool was designed to be used. Instead, participants often had to rely on their memory or stay back after

their shift to enter the handover information. It was also found that while it was thought in the design workshops in Phase Two that linking the information that was readily available from other information systems available in the hospital was the way to go, the accuracy of this available information was sometimes questionable and this had a strong influence on *TEAM DYNAMICS*.

The researcher's interpretation of the above findings is that while participants had indicated how they might use the electronic tool in the design workshops, the full IT requirements are not fully understood till the system is being used. This is likely due to participants not completely understanding their workflow and their IT requirements. This contributes to KF7 (see Section 9.3.7).

It can be seen from the above that there needs to be much consideration in the IT infrastructure and support available in the hospital before introducing an electronic tool as this can create problems if there is inadequate IT infrastructure and support. The IT infrastructure and support also influences the interactions amongst team members as well as the environment in which clinical handover occurs.

This contributes to the understanding of factors which influence clinical handover in KF6 (see Section 9.2.6) and provides answers to RQ2 (see Section 9.3.2).

8.4.6 Team dynamics

Team dynamics is extremely important in clinical handover as the delivery of patient at any time in a hospital is determined by all the team members working together to achieve a common outcome. *TEAM DYNAMICS* was influenced by *WORKLOAD*, *VENUE*, *DISTRACTIONS* and *IT INFRASTRUCTURE AND SUPPORT* in varying degrees from Phases One to Three.

The most important point about team dynamics, however, is the fact that the strong hierarchical influence of team dynamics influenced an individual clinician's performance, behaviour as well as clinical handover outcomes. This also affects to integration of electronic clinical handover into routine clinical handover practice. The most important example is the fact that the utilisation of the tool by interns is actually influenced by the perception of the accuracy of information presented by the IT tool for clinical handover.

The researcher's interpretation of this is that unless the senior clinicians had complete confidence in the IT tool and encourages the utilisation of IT tool in handover, junior clinicians will have to do double work by using the electronic tools as well as other tools to ensure the information presentation fulfils the requirements of their seniors. This has provided answers to RQ2 (see Section 9.3.2).

The relationship between *BEHAVIOUR* and *TEAM DYNAMICS* in the core category *ENVIRONMENTAL CONSIDERATIONS* had a significant influence on clinical handover. This forms part of KF6 (see Section 9.2.6) and provides answers to RQ2 (see Section 9.3.2).

8.5 Clinical handover experiences

The core category *CLINICAL HANDOVER EXPERIENCES* consists of five axial codes (*ATTENDANCE*, *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE*, *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES*) throughout the three phases.

Table 24 shows the relationships between the axial codes in the core category CLINICAL HANDOVER EXPERIENCES

The axial code	influenced the axial code	Phase One	Phase Two	Phase Three
Attendance	Support	Strong	Strong	Moderate
	Educational component	Strong	Strong	Moderate
	Structure	Strong	Strong	Moderate
	Information transfer	Moderate	Moderate	Moderate
	Clinical handover outcomes	Moderate	Moderate	Strong
Support	Educational component	-	-	-
	Structure	-	-	-
	Information transfer	-	-	-
	Clinical handover outcomes	-	Strong	Moderate
	Attendance	-	-	-
Educational component	Structure	-	-	-
	Information transfer	-	-	-
	Clinical handover outcomes	-	-	Strong
	Attendance	-	-	-
	Support	Strong	Strong	Strong
Structure	Information transfer	Moderate	Moderate	Moderate
	Clinical handover outcomes	Moderate	Moderate	Moderate
	Attendance	-	-	-
	Support	Moderate	Moderate	Moderate
	Educational component	Moderate	Moderate	Moderate
Information transfer	Clinical handover outcomes	Strong	Strong	Strong
	Attendance	-	-	-
	Support	-	-	-
	Educational component	-	-	-
	Structure	Moderate	Moderate	-
Clinical handover outcomes	Attendance	-	-	-
	Support	-	-	-
	Educational component	-	-	-
	Structure	-	-	-
	Information transfer	-	-	-

Table 24: Relationships between axial codes across three phases in the core category CLINICAL HANDOVER EXPERIENCE

8.5.1 Attendance

Table 24 illustrates clearly the strong relationship and influence *ATTENDANCE* had on *CLINICAL HANDOVER OUTCOMES*. It is very important to note that *ATTENDANCE* influenced all axial codes in this core category from Phases One through to Three (see Sections 4.3.4.1, 5.2.4.1, 7.2.4.1). These axial codes are seen to be important for clinical handover outcomes.

The introduction of the electronic tool in Phase Three weakened the influence of *ATTENDANCE* on *SUPPORT*, *EDUCATIONAL COMPONENT* as well as *INFORMATION TRANSFER* (see Section 7.2.4.1). The researcher's interpretation of this change in the relationship is that while the electronic tool was not designed to replace the current system of face-to-face handover, it certainly does provide an alternative if clinicians wish to do so. Registrars have indicated that sometimes they will read the information available on the electronic tool and then try to provide support to their interns that way. It was unclear as to whether interns were comfortable with this method of support as it was not highlighted as a form of support by the interns. Secondly, while *ATTENDANCE* influenced *EDUCATIONAL COMPONENT*, the introduction of the electronic tool had weakened this relationship as registrars could review the suggested recommendations on the electronic tool and provide an

educational component that way. More importantly, the electronic tool was not designed for information exchange, only information transfer. Therefore, ideally, participants should still attend clinical handover sessions in order to facilitate discussions and information exchange and only use the electronic tool as a means of information transfer if they were really unable to be physically present at clinical handover sessions.

The influence of *ATTENDANCE* on *CLINICAL HANDOVER OUTCOMES* was strengthened in Phase Three (see Section 7.2.4.1). This was interesting as one would have thought that with the introduction of the electronic tool, *ATTENDANCE* would not have been as important in ensuring *CLINICAL HANDOVER OUTCOMES* were met as the electronic tool would have provided an additional mechanism for information transfer. However, participants seemed to have started recognising that attendance at clinical handover sessions was extremely important in determining clinical handover outcomes. This was likely due to the fact that they were beginning to acknowledge that clinical handover was not just for information transfer but it was also a time used for discussing patients and improving their clinical knowledge. More importantly, it appeared that clinicians were more likely to attend clinical handover sessions on time in Phase Three (see Section 7.2.4.7). This finding is interesting and the researcher's explanation of this is that there are a few possible explanations. Firstly, clinicians attended clinical handover in Phase Three because of their increased awareness and understanding of clinical handover and its importance to patient care. Secondly, clinicians attended clinical handover because the handover sessions were more helpful in providing a good discussion and therefore information exchange in Phase Three. This was because the information transfer was being carried out by the electronic tool and therefore the face-to-face handover meeting would provide time for discussions to clarify patient care. This provides answers to RQ3.

The most interesting finding out of this axial code is actually not the relationship but the attendance itself. Attendance at clinical handover appeared to be an issue in Phases One and Two (see Sections 4.3.4.7 and 5.2.4.7). The clinical handover guidelines and clinical handover manual provided clear directions as to which clinicians had to attend clinical handover. Interviews conducted in Phases One and Two with some participants also indicated that participants would attend handover regularly and punctually. Observation sessions of the same participants however revealed that this was not the case. Some consultants never attended clinical handover sessions while others often arrived late. Some registrars and interns also did not regularly attend clinical handover. This finding contributes to KF7 (see Section 9.2.7).

From the above, it can be seen that attendance at clinical handover sessions is favoured as it is seen to strengthen the outcomes of clinical handover. This is the case regardless of what medium is available for information transfer. Face-to-face discussions are seen as a vital part of clinical handover and should not be replaced completely by other mediums as the transfer of patient care is a process that requires discussion and clarification.

8.5.2 Support

Support during clinical handover was provided in several forms. *SUPPORT* included supervision from more senior clinicians, seeking second opinions, debriefing, serving as a reminder to check test results as well as social support in the form of de-stressing in times of stressful shifts.

Participants utilised clinical handover sessions to improve their clinical communication skills. Many of these functions could only be achieved effectively through face-to-face communication in the presence of more senior clinicians.

SUPPORT was not identified as influencing *CLINICAL HANDOVER OUTCOMES* in Phase One. This was perhaps because participants did not see *SUPPORT* as being an important part of clinical handover. In Phase Two, the support provided at clinical handover seemed to be more widely recognised and therefore the relationship between *SUPPORT* and Clinical *CLINICAL HANDOVER OUTCOMES* was established in Phase Two. In Phase Three, it was found that due to an increasing emphasis on the importance of clinical handover for the continuity of patient care, other functions that were identified before such as debriefing and de-stressing had been marginalised.

This is an interesting finding and can be explained by a few possibilities. Firstly, it is likely that the increasing understanding of clinical handover and acknowledging that the time allocated for clinical handover is important in ensuring the continuity of patient care, participants had marginalised other clinical components which was viewed as being an essential part of clinical handover. Secondly, the introduction of the electronic tool provided asynchronous support by more senior clinicians to more junior clinicians in regard to patient care. Consultants and registrars were now able to glance through the clinical handover information and identify sick patients for review. This support was valuable for patient care. It might therefore be the case that junior clinicians feel that they now received support in other ways. Finally, in Phase Three, registrars and interns tended to utilise the time before or after handover for debriefing and de-stressing. The functions that are associated with clinical handover had not been entirely lost after the introduction of the electronic tool, they are just carried out via other means or at different times. This is an interesting and important finding which is further discussed in KF8 (see Section 9.2.8).

SUPPORT did not have any influence on *EDUCATIONAL COMPONENT*, *STRUCTURE*, *INFORMATION TRANSFER* and *ATTENDANCE* throughout the three phases. The fact that *SUPPORT* did not have any influence on *ATTENDANCE* was surprising as one would have thought that the support provided during handover would be a contributing factor to participants attending handover sessions. The researcher's interpretation of this is that it was probably due to the fact that sometimes there would be an educational component to handover sessions but did not recognise that there were other forms of support being provided as well. This contributes to KF8 (see Section 9.2.8) and provides answers to RQ3 (see Section 9.3.3).

8.5.3 Educational component

The educational component of clinical handover is conducted through a discussion of cases admitted, presented or handed over to the next team. It is interesting to note that throughout the three phases, *EDUCATIONAL COMPONENT* strongly influenced *SUPPORT*. This is the education provided by more senior clinicians during clinical handover to junior clinicians about patient management and this is seen as an important form of support for junior clinicians to perform their day-to-day functions in a clinical environment. The researcher's interpretation of this is that the clinical work environment is often very hectic and therefore it would be difficult to schedule

proper sit-down education sessions with junior clinicians. Clinical handover sessions provide an opportunity to provide the educational component as cases are presented and discussed.

EDUCATIONAL COMPONENT did not have any influence on *STRUCTURE*, *INFORMATION TRANSFER*, and *ATTENDANCE* throughout the three phases. It was surprising that *EDUCATIONAL COMPONENT* did not have any influence on *ATTENDANCE* as junior clinicians had indicated that they valued the educational component during handover sessions. The researcher's interpretation of this is that it is possible that junior clinicians did not view the educational component as a good enough reason to attend clinical handover. A more plausible explanation would be the inconsistencies in providing the educational components during handover. It was observed that an educational component was not provided at every handover session. This was dependent on the senior clinician present and also on the workload and time allocated for clinical handover sessions. It is also the researcher's belief that the educational component is only provided in interesting cases worthy of discussion and debate. Junior clinicians could also have prioritised other things as being more important than attending clinical handover for its educational component.

EDUCATIONAL COMPONENT was not identified as having any influence on *CLINICAL HANDOVER OUTCOMES IN PHASES ONE* (see Section 4.3.4.7) and Two (see Section 5.2.4.7) but was found to have a strong influence on *CLINICAL HANDOVER OUTCOMES* in Phase Three (see Section 7.2.4.7). The researcher's interpretation of this is that clinicians might have a very narrow understanding of clinical handover. They focussed on information transfer in Phases One and Two and the educational component delivered at clinical handover sessions was not in any way related to information transfer. In Phase Three however, the transfer of responsibility and accountability of patient care does require some understanding of patient care delivery and this might explain the reasons for the change in relationship. It is also possible that clinicians have broadened their views regarding the purpose of clinical handover and therefore consider educational component as part of clinical handover. This contributes to KF8 (see Section 9.2.8) and provides answers to RQ3 (see Section 9.3.3).

8.5.4 Structure

The Department of General Internal Medicine had put in place a structure to not only support the clinical handover process but also the information transferred in clinical handover sessions.

STRUCTURE was found to have a moderate influence on *INFORMATION TRANSFER*, *CLINICAL HANDOVER OUTCOMES*, *SUPPORT* and *EDUCATIONAL COMPONENT* throughout the three phases. The researcher's interpretation of this is that having a proper structure in place to assist in the clinical handover process and content should provide some form of order for the transfer of information and provide time for the educational component which in turn provides support for junior clinicians resulting in good clinical handover outcomes. This relationship was only moderate because even with a proposed structure in place, participants did not necessarily adhere to the structure. Secondly, *SUPPORT*, *EDUCATIONAL COMPONENT*, *INFORMATION TRANSFER* and *CLINICAL HANDOVER OUTCOMES* could also be achieved without a set structure but it was highly dependent on the participants who were present at clinical handover session and how that clinical handover session was run.

A significant finding related to this axial code contributes to the key finding that there are differences between perceived and actual handover. The Department of General Internal

Medicine had put in place a structure to support clinical handover and to ensure that clinical handover was conducted in a particular manner through the development of the clinical handover guidelines and clinical handover manual to ensure that all aspects of clinical handover was covered. In Phase One, interviews with participants, especially consultants revealed that clinical handover was an orderly process that followed a set structure (Section 4.3.4.7). However, observation sessions revealed that clinical handover sessions were often disorganised and this was especially true for evening and night handovers. However, consultants in particular did not seem to realise the difference.

This contributes to KF7 (see Section 9.2.7) and provides answers to RQ1 (see Section 9.3.1) and RQ3 (see Section 9.3.3).

8.5.5 Information transfer

INFORMATION TRANSFER was an important axial code identified in Phases One and Two as the main understanding of participants was that clinical handover was about the process of information transfer (see Sections 4.3.4.5 and 5.2.4.5).

Although there had been a shift in the understanding of clinical handover from information transfer to transfer of responsibility and accountability for continuity in patient care in Phase Three (see Section 7.2.4.5), the relationship between Information transfer and Clinical handover outcomes remained strong.

INFORMATION TRANSFER was also found to have a moderate reciprocal relationship with *STRUCTURE* in Phases One and Two (see Sections 4.3.4.5 and 5.2.4.5) but did not exist in Phase Three. The researcher's interpretation of this is that if there was adequate information transfer, participants were more likely to adhere to a set structure for the clinical handover process as there will be more time left to ensure that everything that should be covered is covered. In Phase Three, due to the introduction of the electronic tool, part of the information transfer had become asynchronous and could be achieved without it impacting on the clinical handover processes. It was also likely that the familiarisation with the structure presented in the clinical handover guidelines has helped ensure that most clinical handover sessions follow the recommended structure.

INFORMATION TRANSFER did not influence *ATTENDANCE*, *SUPPORT* and *EDUCATIONAL COMPONENT*.

A significant finding in this core category is the meaning of information transfer. In Phase One, it was interesting to note that while participants had placed a huge emphasis on the importance of information transfer pertaining to a patient during clinical handover (see Section 4.3.4.5), analysis of the data from the semi-structured interviews and observation sessions revealed that it was actually the exchange of information rather than the transfer of information. Theoretically speaking, mere information transfer could occur with an asynchronous communication medium however participants have emphasised the need for face-to-face communication in order to clarify and discuss handover information over the three phases. Apart from exchanging information about a patient, clinical handover also serves to provide environmental¹⁴ and

¹⁴ To identify working conditions which might impact on their shift

situational awareness¹⁵ in providing care to multiple patients. While this is not directly related to the care of individual patients, it has significant impact on the care of all the patients within a shift.

Analysis of the data in Phase Three had revealed that there had been a shift in the emphasis of clinical handover from information transfer to the continuity of patient care. While interns and registrars continued to indicate that the purpose of clinical handover was for information transfer, they now more narrowly defined it as the transfer of information to ensure continuity of patient care. While the electronic tool assisted in the transfer of information, interns and registrars still found the need to have face-to-face meetings to discuss patient care. Participants emphasised the need to have sufficient time allocated for clinical handover to allow for the incoming team to discuss issues and fully understand the care that they would be required to take over. This dedicated time for discussion also served the purpose of allowing the outgoing team to ensure that they have adequately handed over the responsibility of patient care to the next team. Continuity of patient care can only be achieved when transfer of responsibility and accountability is evident during clinical handover. Participants however defined clinical handover as the transfer of information as good information transfer forms the basis for the transfer of responsibility and accountability. Information transfer was also something tangible whereas the transfer of responsibility and accountability remained abstract concepts. It also appeared that participants feel that they can better control the transfer of information and improve on that process rather than the transfer of responsibility and accountability.

The researcher's interpretation of the data is that these changes could be due to two reasons. Firstly, clinical handover had not received much notice until the last few years. The ongoing process of engaging clinicians in the debate and understanding of clinical handover through this research had contributed to the improved understanding and expectations of clinical handover. As a result, aspects of PARTICIPANT ATTRIBUTES had changed which allowed for better information exchange for the continuity of patient care. Secondly, the introduction of the electronic tool had played a significant role in structuring information transfer. The electronic tool required participants to structure the handover information into sections (Issues, actions and comments) and the emphasis on actions and comments in the electronic tool has changed the transfer of responsibility and accountability from an abstract concept to something more tangible which the participants can relate to. This contributes to KF8 (see Section 9.2.8) and provides answers to RQ1 (see Section 9.3.1), RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

8.5.6 Clinical handover outcomes

CLINICAL HANDOVER OUTCOMES refers to whether the clinical handover process has delivered on the pre-designated goals and aims which relate to the need to transfer the responsibility and accountability of patient care from one team to another. On a broader scale however, participants identified other aspects of clinical handover as important such as *SUPPORT* and *EDUCATIONAL COMPONENT*.

¹⁵ To balance the acuity of patient care and workload in delivering patient care with skill mix and number of staff available.

CLINICAL HANDOVER OUTCOMES did not have any influence on *ATTENDANCE*, *SUPPORT*, *EDUCATIONAL COMPONENT*, *STRUCTURE* and *INFORMATION TRANSFER*.

It is important to note that while participants emphasised the need to transfer information and patient care as *CLINICAL HANDOVER OUTCOMES*, participants view *ATTENDANCE* and therefore face-to-face meetings as the most important aspect that influences *CLINICAL HANDOVER OUTCOMES*. Participants are able to clarify and develop trust in the team in face-to-face meetings and therefore develop better team dynamics to support the delivery of patient care. This provides answers to RQ3 (see Section 9.3.3).

8.6 User requirements

The core category *USER REQUIREMENTS* consists of five axial codes (*DOCUMENTATION*, *ACCESS*, *INFORMATION*, *PRIORITISATION* and *TOOLS*) in Phases One and Two only. *USER REQUIREMENTS* was not a core category identified in Phase Three.

Table 25 shows the relationship between the axial codes in the core category *USER REQUIREMENTS*.

The axial code	Influenced the axial code	Phase One	Phase Two	Phase Three
Documentation	Access	Strong	Strong	
	Information	Strong	Strong	
	Prioritisation	Moderate	Strong	-
	Tools	Moderate	Strong	-
Access	Information	Moderate	Strong	-
	Prioritisation			-
	Tools	Strong	Strong	-
	Documentation			-
Information	Prioritisation		Strong	-
	Tools	Moderate	Strong	-
	Documentation	Strong		-
	Access			-
Prioritisation	Tools	Weak	Strong	-
	Documentation			-
	Access			-
	Information	Strong	Strong	-
Tools	Documentation	Moderate		-
	Access	Strong		-
	Information	Strong		
	Prioritisation		Strong	

Table 25: Relationships between axial codes across three phases in the core category *USER REQUIREMENTS*

8.6.1 Documentation

From the analysis of the data in Phase One, *DOCUMENTATION* is seen to be a very important part of clinical handover and clinical handover improvement. *DOCUMENTATION* is seen to have strong influence on *ACCESS* and *INFORMATION* and a moderate influence on *PRIORITISATION* and *TOOLS* (see Section 4.3.5.6). In Phase Two, the importance of *DOCUMENTATION* on clinical handover and clinical handover improvement has increased as evident by the fact that it is now seen to have a strong influence on *ACCESS*, *INFORMATION*, *PRIORITISATION* and *TOOLS* (see Section 5.2.5.6).

The researcher's interpretation of this is that participants had possibly not given much thought about clinical handover and clinical handover improvement in Phase One. It could also be possible that the national guidelines on clinical handover improvement emphasised proper documentation as being important and has influenced the participants' views on this. It was only in Phase Two that *PRIORITISATION* was seen to have a strong influence on *TOOLS* and *INFORMATION*. Clinicians never had to prioritise patients in Phase One and it was only in Phase Two that the concept of prioritisation evolved in the design workshops. Participants also did not appear to have given much thought to the tools that were available to assist with clinical handover in Phase One as they were used to just scribbling down handover notes with a pen and paper. However, this changed in Phase Two when they were asked to consider what they thought might be useful in improving clinical handover. As a result, the changes in the relationship was likely due to the user-centred approach adopted in asking the participants to consider what strategies and tools might influence and improve clinical handover.

While it was important to establish if there were relationships between *DOCUMENTATION*, *ACCESS*, *INFORMATION*, *PRIORITISATION* and *TOOLS*, upon further analysis, it was found that participants actually emphasised the need to have clear documentation as a process despite the fact that it did not appear that they documented clinical handover notes very much at the time of this research. The researcher's interpretation of this data is that participants viewed documentation as important for both patient safety and medico-legal reasons. Participants were really looking at two aspects in documentation. Firstly, they wanted information about the patient which was transferred from one team to another during clinical handover. Proper documentation of this information will allow participants to be able to refer back to the clinical handover information in order to provide continuity of patient care. Secondly, participants wanted a record of who had entered that information and a record of who had completed the task. This was really to provide an audit trail for the transfer of responsibility and accountability for medico-legal reasons. While the second type of documentation might not have any immediate impact on patient care and patient safety, it might improve clinical handover in the long term as the clinical handover process becomes more transparent and clinicians are held accountable for their actions.

These two important aspects to clinical handover documentation (Documentation of patient information and documentation of the clinical handover process itself) are crucial in contributing to KF9 (see Section 9.2.9) and also provides answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

8.6.2 Access

ACCESS was found to have a moderate influence on *INFORMATION* in Phase One (see Section 4.3.5.6) but that relationship strengthened in Phase Two (see Section 5.2.5.6). This was interesting as one would have thought that *ACCESS* would have influenced *INFORMATION* strongly in the two phases. The researcher's interpretation of this is that the changes could be attributed to the fact that in Phase One, participants were used to face-to-face meetings at clinical handover. Therefore, as participants took down their own notes during the handover sessions and this was supplemented with the handover notes given to them (if any), *ACCESS* had less influence on *INFORMATION* as they had taken their own notes at clinical handover. In Phase Two, as participants became aware of the development of the electronic tool, *ACCESS* became more important as they might have

assumed that the electronic tool meant that there was no longer a need for them to take down their own notes and therefore *ACCESS* had a strong influence to *INFORMATION*.

It was not surprising that *ACCESS* had a strong influence on *TOOLS* in both Phases One and Two. The tool that is being used by clinicians must allow clinicians to be able to access the information when they wanted the information for patient care. The researcher's interpretation of this is that there are three main considerations for *ACCESS* whenever a tool is used to improve clinical handover. Firstly, access must be readily available and close to an area where clinical care is delivered. Secondly, simultaneous access would be helpful especially in a team situation at which two or more clinicians have accepted as a group the continuity of care for the patient. Finally, access must allow for easy searching or viewing, especially when clinicians are contacted about a particular patient. This contributes to KF9 (see Section 9.2.9) and provides answers to RQ2 (see Section 9.3.2).

8.6.3 Information

INFORMATION was found to have a strong influence on *PRIORITISATION* in Phase Two (see Section 4.3.5.3) but interestingly did not have much influence on *PRIORITISATION* in Phase One. The researcher's interpretation of this is that it could be due to the different data collection techniques utilised in this research. In Phase One, participants were asked about their clinical handover practice using semi-structured interviews, observation sessions and compilation of clinical handover notes whereas in Phase Two, focus groups and design workshops were used with a view to develop an electronic tool. A more likely explanation is the fact that *PRIORITISATION* was never thought of much by many participants in Phase One and only emerged in Phase Two through the user-centred approach adopted in this research.

INFORMATION was found to have a moderate influence on *TOOLS* in Phase One (see Section 4.3.5.3) and a strong influence in Phase Two (see Section 5.2.5.3). This could be attributed to the fact that participants had not given much thought to the tools available in clinical handover in Phase One but this changed in Phase Two once they were involved in the focus groups to help improve clinical handover.

INFORMATION had a strong influence on *DOCUMENTATION* in Phase One (see Section 4.3.5.3) but this was not the case in Phase Two. The researcher's interpretation of this change is that participants only documented the information that they thought was important in the face-to-face handover in Phase One or that it was likely that they just accepted the verbal handover as it was without properly documenting what was said. Participants had an opportunity to reflect on this practice in Phase Two when asked to assist in developing an electronic tool for clinical handover and now believed that all information should be appropriately documented rather than only documenting what they thought was relevant.

While these relationships are important and it highlights the need to engage clinicians in the design of clinical handover improvement strategies, a more important finding is that clinicians actually faced great difficulties in articulating exactly what information it was that they required at clinical handover. This is interesting given that clinicians provide and receive information all the time at clinical handover sessions and yet they could not clearly identify what was actually needed to deliver safe patient care. Through discussions in the design workshops however, it

became clear that despite the fact that there were variabilities in information requirements, there were some commonalities in the type of information they required. As a result, the electronic tool has provided a section for issues, actions and comments to be entered freely by the participants which enabled them to exercise their clinical autonomy with regards to what information was relevant. This contributes to KF 9 (see Section 9.2.9) and provides answers to RQ2 (see Section 9.3.2).

8.6.4 Prioritisation

PRIORITISATION had a strong influence on *INFORMATION* in Phases One and Two (see Sections 4.3.5.4 and 5.2.5.4). This was not surprising as sick patients needed to be handed over in a more detailed manner and the information requirements were different.

This research found that *PRIORITISATION* had a weak influence on *TOOLS* in Phase One but a strong influence on Phase Two (see Sections 4.3.5.4 and 5.2.5.4). The researcher's interpretation of this is that while participants might not have thought about which tools were useful in Phase One, a more likely explanation would be that participants did not really prioritise patients in Phase One through the use of tools. Participants believed that the prioritisation of patients was important but did not see how they could prioritise these patients and therefore *PRIORITISATION* did not feature strongly in Phase One. However, through adopting a user-centred approach, the importance of prioritisation and the way in which patients could be prioritised was developed.

This is a very interesting and important point as in Phase One, clinicians who receive the handover are the ones who prioritise the patients. In Phase Two, when clinicians were asked to consider what could be done to improve clinical handover, they came up with the concept of prioritising patients but what was different was the fact that it was the outgoing team who prioritised the patients when they entered the handover information into the electronic tool). While this does not seem like a massive change, this posed a big challenge in the practice of medicine as a big change was required of clinicians as they are now not the ones who determine which patients they see first. This contribute to KF1 (see Section 9.2.1), KF10 (see Section 9.2.10) and provides answers to RQ2 (see Section 9.3.2).

8.6.5 Tools

A variety of tools were available to assist in clinical handover. Some of the tools that were readily available in the department included a whiteboard and markers, desktop terminals and pen and paper.

TOOLS had a strong influence on *DOCUMENTATION*, *ACCESS* and *INFORMATION* in only Phase One (see Section 4.3.5.5). This can probably be attributed to the fact that in Phase Two, a decision had already been made to build the electronic tool and so participants did not consider other tools that were available. *TOOLS* had a strong influence on *PRIORITISATION* in Phase Two (see Section 5.2.5.5). This was important as the choice of tool had to support the ability to prioritise patients easily.

From the above, it can be seen that *TOOLS* have a strong influence on *DOCUMENTATION*, *ACCESS*, *INFORMATION* and *PRIORITISATION*. At the same time, *DOCUMENTATION*, *ACCESS*, *INFORMATION* and *PRIORITISATION* affect choice of *TOOLS*. A commitment by the department to develop an electronic

tool resulted in significant insights generated in Phase Two that were not evident in Phase One. This was because participants then had the opportunity to really reflect on their practices in order to determine their requirements of the electronic tool. The user-centred approach adopted in understanding clinical handover and clinical handover improvement has uncovered significant insights from a participant's view about what clinical handover should achieve and how it can be improved. This contributes to KF9 (see Section 9.2.9) and provides answers to RQ2 (see Section 9.3.2).

8.7 Information technology/Information systems considerations

Information technology/Information systems considerations was a core category that emerged in Phase Three after the introduction of the electronic tool. The axial codes within this core category highlights what needs to be considered in ensuring that the introduction of the electronic tool would be successful.

Table 26 shows the relationships between the axial codes in the core category INFORMATION TECHNOLOGY/INFORMATION SYSTEMS CONSIDERATIONS.

The axial code	Influenced the axial code	Phase One	Phase Two	Phase Three
IT knowledge	Tool use	-	-	Strong
	IT issues	-	-	Strong
	Clinical significance	-	-	Strong
	User experiences	-	-	Strong
Tool use	IT issues	-	-	-
	Clinical significance	-	-	Strong
	User experiences	-	-	Strong
	IT knowledge	-	-	-
IT issues	Clinical significance	-	-	Strong
	User experiences	-	-	Strong
	IT knowledge	-	-	-
	Tool use	-	-	Strong
Clinical significance	User experiences	-	-	Strong
	IT knowledge	-	-	-
	Tool use	-	-	Strong
	IT issues	-	-	-
User experiences	IT knowledge	-	-	-
	Tool use	-	-	Strong
	IT issues	-	-	-
	Clinical significance	-	-	Strong

Table 26: Relationships between axial codes across three phases in the core category INFORMATION TECHNOLOGY/INFORMATION SYSTEMS CONSIDERATIONS

8.7.1 IT Knowledge

The varying levels of the participants' *IT KNOWLEDGE* (see Section 7.2.5.1) needs to be a very important consideration in the introduction of the electronic tool as this had a strong influence on *TOOL USE*, *IT ISSUES*, *CLINICAL SIGNIFICANCE* and *USER EXPERIENCES*. This is a significant finding.

The researcher's interpretation of the relationships highlighted above is that the success of the electronic tool is highly dependent on the participants' IT knowledge. This is especially the case as education and training sessions were made widely available after the introduction of the electronic tool but there were still some participants who chose not to attend the education and training sessions. This research has found that participants who were more IT savvy were able to

utilise the tool more easily and resolve issues encountered on their own through trial and error but participants who were less IT savvy required a lot more assistance when they encountered issues in the utilisation of the electronic tool. More importantly, the relationship between *IT KNOWLEDGE* and *TOOL USE*, *CLINICAL SIGNIFICANCE* and *USER EXPERIENCES* persisted despite the training. The researcher therefore concluded that a clinicians' pre-existing IT knowledge is a very important consideration when introducing an electronic tool as that is the determinant of whether the clinician will be comfortable in using technology.

Clinicians who utilised the electronic tool in the way in which it was designed to be used contributed greatly to the *CLINICAL SIGNIFICANCE* of the electronic tool and enhanced other clinicians' *USER EXPERIENCES*. This was extremely important as in order to ensure the ongoing use of the electronic tool, clinicians had to be able to see its significance in terms of contributing to their day-to-day work and had a good experience when using it. Failure to do so would lead to them abandoning the use of the electronic tool.

From the above, it can be seen that while education and training can be provided in the use of the electronic tool, the participants' IT knowledge and their familiarity in the general use of IT plays an important role in determining how comfortable they are with using the electronic tool. This is especially important in a clinical setting where there appears to be a big variation in IT knowledge amongst clinicians. This contributes to KF11 (see Section 9.2.11) and provides answers to RQ2 (see Section 9.3.2).

8.7.2 Tool use

This research has found that *TOOL USE* significantly influenced *CLINICAL SIGNIFICANCE* and *USER EXPERIENCES* (see Section 7.2.5.2). *TOOL USE* did not have any influence on *IT ISSUES AND IT KNOWLEDGE*.

While it appears that these relationships are self-explanatory, in-depth analysis of the data found an interesting trend. The researcher's interpretation of this is that *TOOL USE* was highly significant for not only the experience of the individual user but other users of the electronic tool. *TOOL USE* amongst interns was highly dependent on encouragement from their registrars and consultants as they had a strong influence of whether the interns used the electronic tool. Registrars who were not accepting of the electronic tool did not encourage their interns to use it and some even actively discouraged their interns from using it. As a result, these interns discontinued their use of the electronic tool as they found that they were adding on to their workload by using the electronic tool and having to provide handwritten notes to their registrars as well. On the other hand, interns who have worked with registrars who are accepting of the electronic tool have found that the electronic tool is indeed a useful tool to have. This led to there being an influence on *CLINICAL SIGNIFICANCE* and *USER EXPERIENCES* as other interns working in other teams were now unable to obtain the information from the electronic tool and had to work based on the handwritten information provided to them and incomplete information on the electronic tool. This had a negative effect on *CLINICAL SIGNIFICANCE* and *USER EXPERIENCES*.

From the above, it is important to note that for the electronic tool to cater to the needs of all its users, it was imperative to ensure that the data was accurate and reliable at all times. While the user-centred approach used in this research supported the use of the electronic tool to complement the current practice of clinical handover, there was no mandate on the use of the

electronic tool. Analysis of the data in Phase Three revealed that either all participants use the electronic tool or remain paper based as the reliability of the data in the electronic tool becomes an issue if not everyone uses the electronic tool. This contributes to KF11 (Section 9.2.11) and RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

8.7.3 IT issues

IT ISSUES had a strong influence on *CLINICAL SIGNIFICANCE*, *USER EXPERIENCES* and *TOOL USE*. It was imperative that any issues that arose in the utilisation of the electronic tool be addressed as soon as possible as this had a strong influence on *CLINICAL SIGNIFICANCE*, *USER EXPERIENCES* and *TOOL USE*.

The researcher's interpretation of the data is that IT issues should be minimal given the user-centred approach used but it appeared that IT issues was a major problem. This is interesting given that users were heavily involved in the development of the electronic tool and revision of the electronic tool went through multiple iterations. In addition to that, education and training sessions on the use of the electronic tool was also conducted and a user manual developed to assist in the use of the electronic tool. This therefore suggests that participants could not articulate accurately what they actually wanted in the developmental stages of the tool till they actually used the tool in practice. This contributes to KF 10 (see Section 9.2.10) and RQ2 (see Section 9.3.2).

One IT issue became apparent through analysis of the data. Since the introduction of the electronic tool, the accuracy and reliability of the information presented as highly dependent on the participants vigilantly accurately entering the information and keeping that information updated. This posed a problem as there had not previously been a strong culture in providing clear documentation of clinical handover notes amongst participants and the electronic tool created issues when the interns who had completed the tasks did not sign off to indicate that the task had already been completed. With a paper based system, interns chose to either not handover the task or just cross out the task when it had already been completed. With the electronic tool, interns had to log on to the electronic tool and check the boxes to indicate that the task had already been completed and some interns were not as vigilant as others in signing off completed tasks. This then affected the interns in the next shift as these tasks were then highlighted as outstanding tasks in the electronic tool. This in turn had a negative effect on *USER EXPERIENCES* and *CLINICAL SIGNIFICANCE* as interns in the next shift could not depend on the information in the electronic tool and reduced the *CLINICAL SIGNIFICANCE* of the electronic tool considerably.

The researcher's interpretation of this is that the introduction of the electronic tool must be supported by a strong culture of clinical handover amongst clinicians before the introduction of the electronic tool. It is unlikely that the use of the tool itself will develop a culture in clinical handover. Clinical must ensure that all handover information and documentation is up to date in order to ensure the integrity of clinical handover information and clinical handover practice. This contributes to KF11 (see Section 9.2.11) and RQ3 (see Section 9.3.3).

8.7.4 Clinical significance

It was imperative that participants could see the clinical significance in utilising the electronic tool in order to ensure sustainability. *CLINICAL SIGNIFICANCE* had a strong influence on *USER EXPERIENCES*

and *TOOL USE*. Participants were more likely to utilise the electronic tool if they could see the significance in using it and if all participants utilised the tool in the manner in which it was designed to be utilised it resulted in a better overall User experience.

CLINICAL SIGNIFICANCE did not have any influence on *IT ISSUES* and *IT KNOWLEDGE*.

The researcher's interpretation is that while it is difficult to measure clinical significance, one approach is based on the users' judgement as to whether the use of the electronic tool has helped them in clinical practice and this in turn affects the sustainability of the electronic tool. As such, while the evaluation of most electronic clinical handover systems was focused on quantitative measures, the perception of users should also be an important consideration as it supports sustainability. This contributes significantly to RQ3 (see Section 9.3.3).

8.7.5 User experiences

It is important to ensure that participants have a good experience in utilising the electronic tool as if they encounter many difficulties, it is likely that they will abandon the use of the tool. *USER EXPERIENCES* had a strong influence on *TOOL USE* and *CLINICAL SIGNIFICANCE*. When users had a good experience in using the tool, they not only will continue to use it but will encourage others to use it. However, if they have negative experiences in using the tool, they will discontinue the use of the tool. Their perceptions of whether the tool has made a difference to clinical handover patient safety is often based on their experiences in using the tool.

USER EXPERIENCES did not have any influence on *IT KNOWLEDGE* and *IT ISSUES*.

The researcher's interpretation is that while the electronic tool was only meant as a support tool for clinical handover, the use of the electronic tool should be mandatory. The electronic tool should not replace current face-to-face handover practices but all participants need to utilise the tool in order for it to reach its full potential. Failure to do so will result in the electronic tool being a hindrance and compromising patient safety as if one participant decides not to use the electronic tool, the data reflected in the tool is no longer reliable and this has a ripple effect on *USER EXPERIENCES* which ultimately deter participants from using the electronic tool. This contributes to KF 11 (see Section 9.2.11) and RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

8.8 Relationship between core categories

This section provides a detailed description of the six core categories throughout the three phases which emerged from the integrated analysis conducted. These six core categories are: DEPARTMENTAL REQUIREMENTS, PARTICIPANT ATTRIBUTES, ENVIRONMENTAL CONSIDERATIONS, IT/IS CONSIDERATIONS, USER REQUIREMENTS and CLINICAL HANDOVER EXPERIENCE.

Figure 55 illustrates the relationships between the core categories across the three phases.

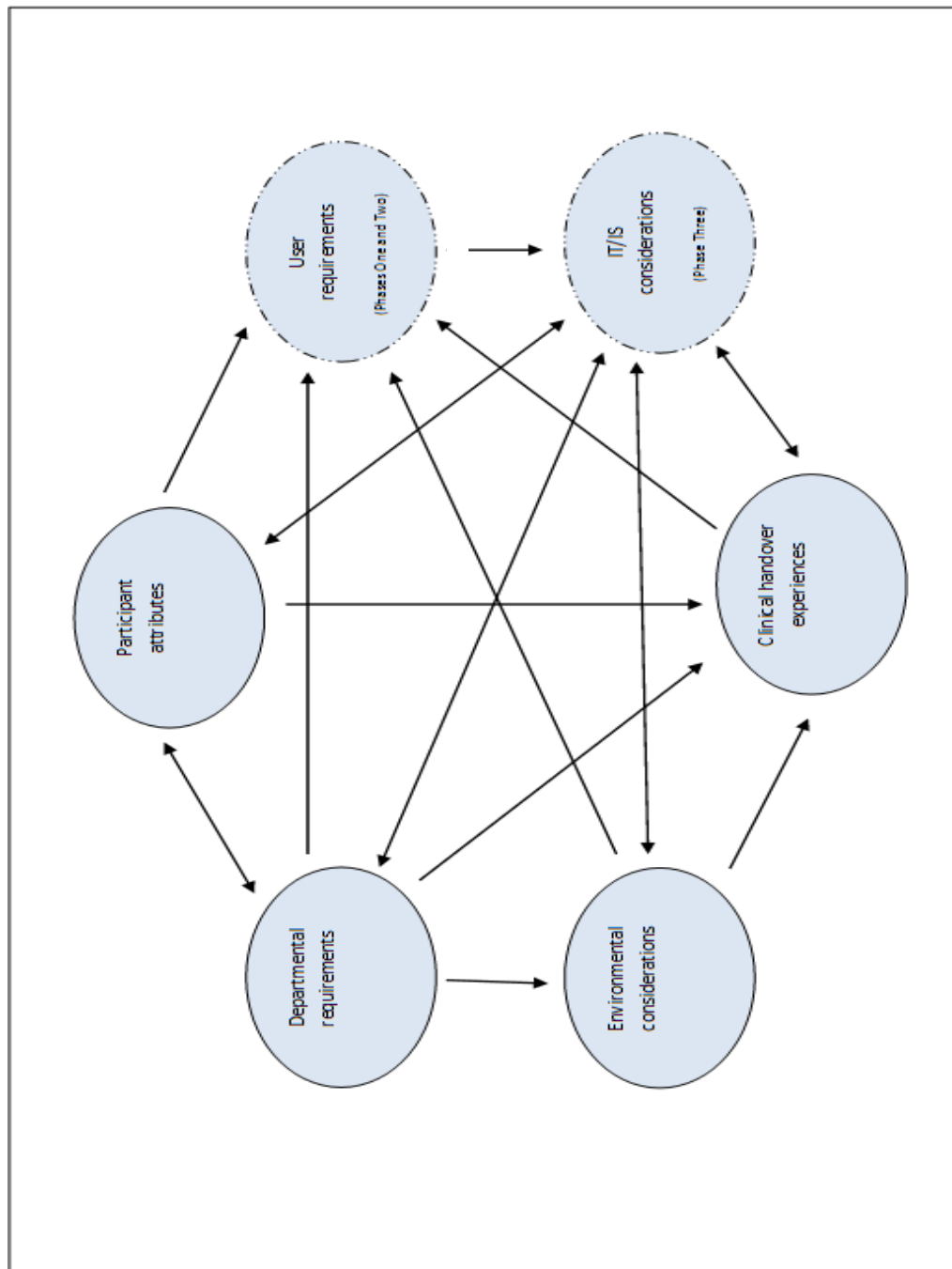


Figure 55: Relationship between core categories across three phases

From Figure 55 , it can be seen that DEPARTMENTAL REQUIREMENTS influences PARTICIPANT ATTRIBUTES. A unilateral relationship exists between the axial codes *EDUCATION AND TRAINING* (DEPARTMENTAL REQUIREMENTS) and *UNDERSTANDING* (PARTICIPANT ATTRIBUTES). A reciprocal relationship exists between *UNDERSTANDING* (PARTICIPANT ATTRIBUTES) and *HANDOVER CULTURE* (DEPARTMENTAL REQUIREMENTS). This is evident in the partial contribution of changes in the understanding of clinical handover amongst participants to contributing to the emergence of a culture of handover. This is further discussed in KF1 (see Section 9.2.1) and KF2 (see Section 9.2.2) in the next chapter.

DEPARTMENTAL REQUIREMENTS influences ENVIRONMENTAL CONSIDERATION. A unilateral relationship exists between the axial codes *POLICIES AND GUIDELINES* (DEPARTMENTAL REQUIREMENTS) and *VENUE* and *NUMBER OF PARTICIPANTS* (ENVIRONMENTAL CONSIDERATIONS). The clinical handover guidelines and clinical handover manual clearly state where the clinical handover session is to be held and who should be present. While this worked well for morning handover, evening handover was found to be ad-hoc and chaotic and this remained the case throughout the three phases.

DEPARTMENTAL REQUIREMENTS influences USER REQUIREMENTS. A complex relationship exists between *POLICIES AND GUIDELINES* (DEPARTMENTAL REQUIREMENTS) on *DOCUMENTATION*, *PRIORITISATION* and *INFORMATION* (USER REQUIREMENTS). The complexities in this relationship arise due to the difficulties encountered by participants in expressing what they want and therefore the difficulties in obtaining user insights to inform *POLICIES AND GUIDELINES*. This is discussed further in KF10 (see Section 9.2.10).

DEPARTMENTAL REQUIREMENTS influences CLINICAL HANDOVER EXPERIENCES. A strong unilateral relationship exists between *DEPARTMENT TRADITION* (DEPARTMENTAL REQUIREMENTS) and *ATTENDANCE* (CLINICAL HANDOVER EXPERIENCES). A changing relationship is also established between *POLICIES AND GUIDELINES* (DEPARTMENTAL REQUIREMENTS) and *STRUCTURE* (CLINICAL HANDOVER EXPERIENCES). This was especially evident for morning handover. This is discussed further in KF5 (see Section 9.2.5).

PARTICIPANT ATTRIBUTES influences USER REQUIREMENTS. A unilateral relationship exists between *UNDERSTANDING* (PARTICIPANT ATTRIBUTES) and *INFORMATION* (USER REQUIREMENTS). There is surprisingly not much influence between *UNDERSTANDING* (PARTICIPANT ATTRIBUTES) and other axial codes within the core category USER REQUIREMENTS. This is likely attributed to the strong influence between *DEPARTMENT TRADITION* (DEPARTMENTAL REQUIREMENTS) and USER REQUIREMENTS. This is further discussed in KF3 (see Section 9.2.3).

PARTICIPANT ATTRIBUTES influences CLINICAL HANDOVER EXPERIENCES. This unilateral relationship is especially evident in *INDIVIDUAL PERSONALITIES* and *UNDERSTANDING* (PARTICIPANT ATTRIBUTES) influencing *ATTENDANCE* (CLINICAL HANDOVER EXPERIENCES)). Another unilateral relationship which is deemed to be very significant in this research is the influence of *CULTURAL BACKGROUND* (PARTICIPANT ATTRIBUTES) on *CLINICAL HANDOVER OUTCOMES* (CLINICAL HANDOVER EXPERIENCES). This is further discussed in KF4 (see Section 9.2.4).

ENVIRONMENTAL CONSIDERATIONS influences USER REQUIREMENTS. A unilateral relationship exists between *WORKLOAD* (ENVIRONMENTAL CONSIDERATIONS) and *DOCUMENTATION* (USER REQUIREMENTS). This is further discussed in KF5 (see Section 9.2.5).

ENVIRONMENTAL CONSIDERATIONS influences CLINICAL HANDOVER EXPERIENCES. This unilateral relationship exists between *WORKLOAD* (ENVIRONMENTAL CONSIDERATIONS) and *ATTENDANCE* and *CLINICAL HANDOVER OUTCOMES* (CLINICAL HANDOVER EXPERIENCES). *WORKLOAD* (ENVIRONMENTAL CONSIDERATIONS) also influences *SUPPORT* and *EDUCATIONAL COMPONENT* (CLINICAL HANDOVER EXPERIENCES). This is further discussed in KF5 (see Section 9.2.5).

CLINICAL HANDOVER EXPERIENCES influences USER REQUIREMENTS. A unilateral relationship exists between *INFORMATION TRANSFER* (CLINICAL HANDOVER EXPERIENCES) and *DOCUMENTATION* and *INFORMATION* (USER REQUIREMENTS). The need to provide information to the next team dictates the need for adequate documentation and information about patient care.

USER REQUIREMENTS in Phases One and Two has a unilateral relationship with IT/IS CONSIDERATIONS in Phase Three. USER REQUIREMENTS influences *TOOL USE* (IT/IS Considerations). Prioritisation (USER REQUIREMENTS) influences *TOOL USE* and USER EXPERIENCE (IT/IS Considerations). This is further discussed in KF10 (see Section 9.2.10).

IT/IS CONSIDERATIONS influences all the other core categories. IT/IS considerations adds to the complexity of existing relationships between core categories when an electronic tool is introduced. Education and training (DEPARTMENTAL REQUIREMENTS) must consider IT Knowledge (IT/IS CONSIDERATIONS) as one of the elements for the use of the electronic tool. A more significant finding however, is the influence of *TOOL USE* on *POLICIES AND GUIDELINES* to mandate the use of the electronic tool. This is further discussed in KF11 (see Section 9.2.11).

IT/IS CONSIDERATIONS influences PARTICIPANT ATTRIBUTES. A unilateral relationship exists between *TOOL USE* (IT/IS CONSIDERATIONS) and *CULTURAL BACKGROUND* and *INDIVIDUAL PERSONALITIES* (PARTICIPANT ATTRIBUTES). It mitigates the influence that both *CULTURAL BACKGROUND* and *INDIVIDUAL PERSONALITIES* have on *BEHAVIOUR*.

IT/IS CONSIDERATIONS has a reciprocal relationship with ENVIRONMENTAL CONSIDERATIONS. This relationship was only established after analysing the data across the three phases. A unilateral relationship exists between *TOOL USE* (IT/IS CONSIDERATIONS) and *WORKLOAD*, *VENUE* and *DISTRACTIONS* (ENVIRONMENTAL CONSIDERATIONS). This is further discussed in KF5. A unilateral relationship exists between *VENUE*, *IT INFRASTRUCTURE AND SUPPORT* (ENVIRONMENTAL CONSIDERATIONS) and *IT ISSUES* and *TOOL USE* (IT/IS CONSIDERATIONS). This is further discussed in KF10 (see Section 9.2.10).

IT/IS CONSIDERATIONS influences CLINICAL HANDOVER EXPERIENCES. A unilateral relationship exists between *TOOL USE* (IT/IS CONSIDERATIONS) and *ATTENDANCE* and *SUPPORT* (CLINICAL HANDOVER EXPERIENCES). This is further discussed in KF8 (see Section 9.2.8).

The researcher's interpretation of the relationships between the core categories identified is that the most important are the increasing layers of complexities across the three phases, especially

when the three phases were analysed together to establish the relationships between axial codes in different core categories. This is due to the fact that the complexities of clinical practice cannot be accurately reflected in a single snapshot and hence the relationships are not established when data is collected in a single snapshot and analysed independently. This research utilising a multi-snapshot approach to data collection and analysis has contributed to research methods in healthcare. The multi-snapshot approach adopted has allowed for the researcher and the users to be fully-engaged in the discussion of the topic of clinical handover and clinical handover improvement and more importantly facilitated an in-depth understanding and analysis of the evolving clinical practice. It has also allowed for consideration of external contextual aspects which contributed to the evolving understanding of clinical handover and provided insights into the clinical handover improvement process.

This research has adopted a user-centred approach to collect qualitative data and analysed these data drawing on the principles of grounded theory to obtain an in-depth understanding of clinical handover and clinical handover improvement. User requirements for clinical handover improvement were elicited through this process and an electronic tool was developed but it is important to note that the development of the electronic tool was not the focus of this research. Data collection conducted after the introduction of the electronic tool was aimed at enriching the findings obtained from the first two phases of this research. This research has found that the initial data collection and analysis conducted in Phases One and Two have had significant impact on eliciting user requirements and understanding of the electronic tool. More importantly, the development of the electronic tool together with the users and the influence of the electronic tool on clinical handover provides significant insight into the initial data collection and analysis conducted in Phases One and Two.

This thesis has therefore argued that it is important to adopt a multi-snapshot approach utilising multiple data collection techniques to understanding clinical handover and clinical handover improvement and has contributed to the field of IS research conducted in a healthcare setting.

8.9 Chapter reflections

This chapter has provided an analysis and interpretation of the data across the three phases. It has highlighted the relationships between axial codes within each core category and the relationships between axial codes across core categories to reveal the complexities of clinical handover and why it is important to use a user-centred approach but at the same time acknowledging its limitations and collect data over multiple phases to obtain an in-depth understanding of the phenomena studied. The significant findings from the analysis and interpretation of this chapter which was formed based on analysis of the data from Chapters 4 to 7 will be further interpreted and discussed in relation to available literature in the next chapter.

Most of the key findings identified and presented in the next chapter only emerged from analysing and interpreting the data over three phases, especially the relationships which were established or changed over the three phases. These added layers of complexities and interrelationships contributing to clinical handover and clinical handover improvement can only be obtained when the data from the three phases were analysed and interpreted together.

This chapter has therefore reinforced that the research design needs to incorporate a multi-snapshot approach utilising multiple data collection techniques as it creates a new dimension into the understanding of clinical handover and clinical handover improvement.

The next chapter presents the key findings which have emerged from the integrated data analysis and interpretation conducted across three phases. The next chapter will provide an interpretation of these key findings and provide a discussion about the significance of these findings in relation to available literature and in answering the research questions.

Chapter 9 Interpretation and discussion of key findings

9.1 Introduction

This chapter presents the eleven key findings which emerged from interpreting the data across the three phases in Chapter 8. These key findings are further interpreted in this chapter and discussed in relation to the available literature and in relation to the research questions and research objectives stated in Section 1.4.

- Section 9.2 presents an interpretation and discussion of the key findings which emerged from the integrated analysis and interpretation of the data in Chapter 8. These key findings are stated as follows:

KF1: Clinical handover is a complex, dynamic and evolving clinical system and its status needs to be viewed from a contextual, clinical and user perspective. This is a significant finding as it provides a conceptual understanding of the process of clinical handover and contributes to knowledge at a theoretical level.

KF2: A formal education and training program with established standards is imperative for clinical handover improvement. This finding suggests the need for standards in the practice of clinical handover and a standardised education and training curriculum for clinical handover improvement.

KF3: Clinical handover culture is important in clinical handover improvement and the development of a clinical handover culture requires an incremental approach. This finding explores the development of clinical handover culture and the influence of department tradition on the practice of clinical handover after the introduction of electronic tool to support handover. The development of clinical handover culture requires an incremental approach.

KF4: The understanding of clinical handover amongst clinicians vary and this variability in understanding significantly influences the behaviours of clinicians during clinical handover and practice of clinical handover. The understanding of clinical handover, however, has converged over time to focusing on the continuity of patient care.

KF5: The strongest personal attributes that influence clinical handover and clinical handover improvement is cultural background and individual personalities. These influences however, could not be easily controlled or altered.

KF6: Various factors affect clinical handover but it is the nature of these factors that influence team dynamics which in turn influence clinical handover and clinical handover improvement. Clinicians work as a team, and as such the collegiality of the team needs to be maintained when dealing with factors which affect handover.

KF7: There is a significant difference between perceived and actual handover. This difference has a significant impact on clinical handover especially in the development of electronic tools. This difference is the greatest among senior clinicians.

KF 8: Clinical handover serves various different functions and these functions changes after the introduction of electronic clinical handover support tool. It is important that these functions are maintained through other means after the introduction of an electronic tool.

KF9: An over-arching user-centred approach is important to engage all users before conducting user-requirements for electronic clinical handover support tool design and implementation. Different users can be involved at different levels but it is essential that all users are involved in the process of clinical handover improvement.

KF10: While a user-centred approach is extremely useful, there are many challenges associated with this approach in clinical handover improvement and quality and safety initiatives. Some of these challenges are due to the fact that the researcher has no clinical background but some of these challenges are related to the complexity of medical practice.

KF11: If an electronic tool is to be introduced for clinical handover improvement, it is imperative to mandate the use of the electronic tool for all clinical handover sessions. Despite the fact that the electronic tool was designed as a support tool rather than a replacement tool, unless all participants use the electronic tool on a regular basis, the accuracy and reliability of the information contained in the tool is compromised.

- Section 9.3 provides answers to the research questions and associated research objectives. This section firstly provides a conceptual framework to understand clinical handover and therefore provides the answer to the first research question. Secondly, this section provides not only the insights to understand clinical handover improvement but also argues the importance of how to generate these insights. Finally, this chapter discusses the benefits and challenges of using user-centered approach in the development of an electronic tool within a healthcare setting.
- Section 9.4 provides a summary reflection of the chapter.

9.2 Key findings

This section provides an interpretation and discussion of the key findings in relation to available literature which emerged from the integrated analysis and interpretation of the data across the three phases presented in Chapter 8.

9.2.1 Clinical handover is a complex, dynamic and evolving clinical system and its status needs to be viewed from a contextual, clinical and user perspective (KF1).

This key finding emerged in part from the analysis and interpretation of the data from core categories DEPARTMENTAL REQUIREMENTS (see Section 8.2) and PARTICIPANT ATTRIBUTES (see Section 8.3). The axial codes *POLICIES AND GUIDELINES* (see Section 8.2.1) and *CLINICIAN'S ROLE* (see Section 8.2.2) from the core category DEPARTMENTAL REQUIREMENTS, and the axial codes *UNDERSTANDING* (see Section 8.3.1) and *EXPECTATIONS* (see Section 8.3.2) from the core category PARTICIPANT ATTRIBUTES contributed to the emergence of this key finding.

9.2.1.1 Interpretation

This research found that clinical handover is a complex clinical system. Given the lack of uniform understanding of clinical handover, clinical handover is highly dependent on each individual clinician and as such, is a dynamic process. The concept of clinical handover had evolved over the three phases. Therefore, it is important to consider understanding the status of clinical handover in any hospital from three perspectives: a contextual perspective, a clinical perspective and a user perspective. These three perspectives are elaborated further below.

From a contextual perspective, it became apparent to the researcher that there was variability in the understanding of clinical handover amongst clinicians and between clinical guidelines and clinical practice. Part of this variability is due to the evolving nature of clinical handover from Phase One to Phase Three. The evolving nature of clinical handover as a concept had a lot to do with national and international initiatives. In Phase One, clinical handover was not an area of high priority in clinical practice amongst clinicians. While there had been a long standing tradition of ensuring good handover in nursing, this was not the case in medical practice. As a result, there was little attention paid to clinical handover at both the national and international level. Formal education and training in clinical handover had not been provided to clinicians in their undergraduate medical training and postgraduate medical training as this was not viewed as an important part of their work. In Phase Two, this research project had generated significant discussions amongst clinicians and therefore raised the awareness of the importance of clinical handover at the Royal Hobart Hospital. By Phase Three. The Australian Medical Association and the Australian Commission on Safety and Quality in Health Care had made clinical handover a priority in medical practice. As a result, the evolving understanding of clinical handover amongst clinicians through this research needs to be considered together with the contextual environment at a organisation, national and international level.

The complexity of clinical handover and the variability in the practice of clinical handover needs to be considered from a clinical perspective. This is especially important when analysis of the data revealed that clinicians played the most attention during morning handover sessions and almost no attention at all during evening handover sessions. The significant differences in the practice of clinical handover between the three sessions remained prominent through the three phases. This was despite the shift in the clinicians' understanding of clinical handover from a transfer of information to a transfer of responsibility and accountability and the influence of the introduction of the electronic tool in Phase Three. The practice of clinical handover therefore needs to be considered from a clinical perspective. In order to understand the status of clinical handover, one needs to take into account the role of clinical handover within clinical practice from the clinicians' perspective and the researcher's (an outsider's) perspective. During morning handover, it was important to note that the transfer of the responsibility of patient care was permanent. Patients who were seen and admitted by the night team were taken care of by the day team in the long term. As a result, the transfer of responsibility and accountability of patient care was permanent. The transfer of responsibility and accountability of patient care in the evening and night shifts was temporary and it was less likely that the patient would require care. In other words, unless the patient required care in the evening or at night, the responsibility of patient care would not need to be actioned upon by the evening or night team. However, the likelihood that a patient would require care at night was more probable given that it was a longer period of time as

compared to the evening and therefore, night handover was relatively important. Another significant difference between evening and night handover was that evening handover is seen more as a distraction in their shift as the on-take team would have to stop whatever they were doing to receive handovers from the other teams at 4:30pm. Night handover on the other hand marked the end of a fourteen hour shift for the on-take team and it was a time when they could handover to the night team (see Section 1.5.3). The complexity of clinical handover from a clinical perspective is extremely important and it not only determines the status of clinical handover but also provides insights for clinical handover improvement.

Finally, the status of clinical handover needs to be viewed from the users' perspectives. While it appeared that all clinicians were users of the clinical handover system, there were significant insights from this research regarding users which increased the complexities of clinical handover and clinical handover improvement. Firstly, users traditionally had different roles in patient care depending on their level of seniority and therefore played different roles at clinical handover. Interns transferred their responsibility by transferring the tasks requiring completion. Registrars and consultants on the other hand often handover abstract care requirements of patients such as the diagnosis and prognosis rather than individual tasks. The interns' handover were therefore considered less important and as a result was reflected in the clinical handover guidelines as being allocated minimal time. This also reflected their overall role in patient care and their role in decision making within the department. From the analysis of the data, it appeared that because interns handover specific tasks at clinical handover, they were the best cohort of clinicians to consider trialling an electronic tool as their routine roles in clinical handover were much better defined. All users however needed to be engaged in the process as the ultimate decision making is usually not made by interns. This was reflected in the clinical handover guidelines that were written by the consultants. As a result, it was important to utilise an over-arching user-centred approach incorporating multiple data collection techniques in order to engage all users (see Section 3.4). The suggestion of user engagement through this finding is important and when combined with data from all other core categories contributed to the emergence of KF9 (see Section 9.2.9).

9.2.1.2 Discussion

This key finding has established that clinical handover is a complex and dynamic process. The status of clinical handover should be viewed through a contextual, clinical and user perspective. This section discusses this finding in relation to the available literature.

The literature has suggested that clinical handover is a uniform practice within a specific organisation. However, a more in-depth review of the literature across different publications indicated that clinical handover was a complex and dynamic concept. There was no clear consensus of what clinical handover was and what activities fell under the term "clinical handover" (Cohen and Hillgoss, 2010, Wong *et al.*, 2008). In Phase One, there were only a few articles published in clinical handover in medicine. The available literature at that time did not identify that there was variability in the practice of clinical handover (Australian Council for Safety and Quality in Health Care, 2005). A review of the available literature indicated that there were few studies out there which defined the term "clinical handover" as well as what constituted clinical handover. The Australian Council for Safety and Quality in Health Care grouped many

different clinical activities together under the banner of clinical handover. These activities included discharge to community, medication reconciliation, shift-to-shift handover, inter-hospital transfer and other clinical activities (Australian Council for Safety and Quality in Health Care, 2005). The literature linking different activities to clinical handover most certainly contributed to the confusion with regards to the understanding of clinical handover by clinicians and researchers.

As this research focused on shift-to-shift clinical handover, a review of the literature in that area found that there was a lack of clear understanding of clinical handover (Bomba and Prakash, 2005, Horn *et al.*, 2004, Manias and Street, 2000, Sherlock, 1995). The complexities of clinical handover had been reported in medical shift-to-shift handover (Bomba and Prakash, 2005), nursing handover (Manias and Street, 2000, Sherlock, 1995) and handover between anaesthetists (Horn *et al.*, 2004). This is interesting as when considering clinical handover improvement, the literature appears to have assumed that clinical handover is a uniform practice (Australian Council for Safety and Quality in Health Care, 2005).

This research has therefore contributed significantly to the understanding of clinical handover by highlighting the complex and heterogeneous of the clinical handover process. It has also developed a conceptual framework to understand the status of clinical handover in a hospital at a particular time. This conceptual understanding first took into account the context of the environment in which clinical handover occurred within. This was an interesting point as the available literature had not established a relationship between external influences on hospital practice in the area of clinical handover. This research has also argued that a clinical perspective of handover is important especially in relation to the delivery of patient care by the team of clinicians involved. This not only explained the difference between morning, evening and night handover but also explained the differences between nursing and medical handover as well shift-to-shift handover in different specialties. Finally, it was important to take into consideration the status of clinical handover from a users' perspective taking into account differences in their seniority levels.

This research has also argued that the understanding of clinical handover from three perspectives is important as it assisted in the use of a user-centred approach selection of areas of clinical handover that might require a different strategy for clinical handover improvement. This research found that clinical handover between interns were the best fit for the trial of an electronic tool as different users had different needs from clinical handover. This is a significant contribution to knowledge as the available literature did not make any distinctions between users or clinical practice when clinical handover improvement interventions, particularly electronic tools were introduced.

While this research has focused on shift-to-shift clinical handover within the Department of General Internal Medicine, it has widespread implications in regard to quality and safety and the use of electronic tools in healthcare. Quality and safety initiatives are often developed to be applicable across different healthcare settings (Ortiz and Clancy, 2003). This is reflected in the World Health Organisation's High Five Priority Initiatives (O'Leary, 2006). The assumption is that the improvement strategies developed for clinical practice can be adopted by all (O'Leary, 2006).

This research cautions this approach and the assumption that clinical practice is the same across different healthcare settings. This research has illustrated the importance of understanding clinical handover and clinical handover improvement through a contextual, clinical and user perspective in order to understand the dynamic complexities of clinical handover practice.

9.2.2 Formal education and training with established standards is imperative for clinical handover improvement (KF2)

This key finding emerged from the analysis and interpretation of the core category DEPARTMENTAL REQUIREMENTS (see Section 8.2). The axial codes *POLICIES AND GUIDELINES* (see Section 8.2.1) and *EDUCATION AND TRAINING* (see Section 8.2.3) contributed to this key finding. This key finding contributes in part to KF1 (see Section 9.2.1) and KF4 (see Section 9.2.4) and provides answers to RQ2 (see Section 9.3.2)

9.2.2.1 Interpretation

This research found that clinicians indicated especially in Phases One and Two that there was no education and training in clinical handover available and that they believed that education and training was an important aspect to consider in clinical handover improvement. It is important to note that education and training was not part of the interview question frame (see Sections 3.5.1.2, 3.5.2.1, 3.5.3.2) but through the interview process, this came up as a significant issue and the researcher used probes to understand this further. It is interesting to note however that when education and training sessions were provided in Phase Three, some clinicians chose not to attend those sessions and claimed that they could learn about clinical handover through utilisation of the electronic tool. It was also noted that consultants and registrars seemed reluctant at times to provide education and training about clinical handover to interns due to the fact that they lacked the confidence to do so (see Section 8.2.3). From the above, it can be concluded that while education and training in clinical handover is important, establishing standards for this clinical practice and a formal education and training program is more important.

Data analysed in Phases One and Two revealed that clinicians, especially interns and registrars believed that they had not received education and training in clinical handover. In Phase Three however, despite the fact that education and training had been provided to interns and registrars on clinical handover and the use of the electronic tool, some registrars still express reservations about providing education and training on clinical handover to their interns.

It was interesting that clinicians appeared to have no problems handing over information routinely but lacked the confidence to educate their juniors in clinical handover. Clinicians learn through a process of osmosis but as some clinicians had doubts about their clinical handover practice, they were hesitant to educate their juniors on how to handover patients. Another point of interest was that through this research and the amount of time spent with the participants, it was revealed that the clinicians who actually doubted their clinical handover skills were perceived by others to provide good handovers. This was likely due to the fact that they were unable to compare their practice of clinical handover to established standards.

Clinicians on one hand emphasised the importance of having a leader demonstrate how a good clinical handover is conducted so that they could model their behavior but on the other hand,

request formal education and training of clinical handover through an undergraduate or post-graduate training program. This was interesting as the osmosis learning model seemed to be the way that junior clinicians learn most in a clinical environment and clinicians in this research had no difficulties in identifying good and bad handover practices and which one they should model. However, they still required evidence of best practice in clinical handover and learning it through formal channels through undergraduate or post-graduate training. This conflict was likely due to the fact that clinicians largely work in a scientific evidence-based environment and their scientific background leads to them looking towards evidence-based practice through the establishment of standards in clinical handover.

The complexity of clinical handover has led clinicians to develop variabilities in their understanding but recognising the need to develop common grounds in which they can all relate to in a simplistic way (KF4 see Section 9.2.4). This emergence of a common ground and common understanding evolved throughout the three phases. Clinicians deal with complexities by simplification and classification and they apply this in clinical handover too. As such, while education and training is important in clinical handover improvement within each hospital, there needs to be standards established to guide the education and training preferably through formal undergraduate or post-graduate training programs to ensure that clinicians feel that they indeed have the knowledge to deliver good handover.

9.2.2.2 Discussion

This research has highlighted that education and training is imperative in clinical handover improvement but more importantly, it was important to establish formal standards in clinical handover. This section discusses this key finding in relation to available literature.

While it appears that a straightforward answer to this problem is to develop a formal education and training program in clinical handover, the lack of a uniform understanding of clinical handover (see Section 8.3.1) and the variability and evolving nature of the functions of clinical handover (see Section 9.2.8) has resulted in significant challenges in developing an education and training program for clinical handover. A review of the literature had found little in the area of education and training in clinical handover (Wong *et al.*, 2008) and there was no defined curriculum for clinical handover. Clinicians had stressed the importance of education and training in clinical handover in this research and through the use of a user-centred approach, key insights in clinical handover improvement obtained were incorporated into an education and training program delivered by the clinical handover project registrar. While the education and training program provided fell short of addressing the standards required for clinical handover, this was deemed to be an important starting point as this has since been incorporated into the OSSIE Guide as the national standard (Australian Commission on Safety and Quality in Health Care, 2010). While not originally intended, the electronic tool that had been developed also served as an educational tool as it required participants to enter information in a structured manner. This research has found that the education and training program that had been developed and delivered as part of this research assisted in the change in the way in which clinical handover was conducted and developed a culture in clinical handover which appears to be the most important element in clinical handover improvement (see Section 8.2.4).

The education and training program developed as part of this research has since been developed further by the ACSQHC. The clinical handover education and training curriculum in the OSSIE Guide is informed by the education and training requirements gathered through the user-centred approach used in this research (Australian Commission on Safety and Quality in Health Care, 2010).

Since the completion of this research, the role of education and training, especially in supporting a change in clinical handover has been further validated by others (Johnson and Arora, 2009). The emphasis on delivering education and training in clinical handover was supported by Farnan (2010), Catchpole (2010) and Thompson *et al.* (2011). Johnsons and Arora (2009) and Catchpole (2010) supported the finding that education and training for clinical handover is important in developing or sustaining handover culture as well as the need to have a uniform approach to clinical handover education.

This research had developed a basic education and training curriculum for clinical handover for clinicians at the Department of General Internal Medicine, Royal Hobart Hospital. At a national level, the OSSIE Guide (Australian Commission on Safety and Quality in Health Care, 2010) which had adopted and modified the education and training program developed in this research has been developed for the Australian context. In the US, an educational framework and competency based training had been proposed (Arora *et al.*, 2008). More recently, a simulated training for clinical handover was studied and this pilot program found education and training of clinical handover to be very useful amongst clinicians (Farnan *et al.*, 2010). While further work needs to be done in this area to develop standards and education and training programs to support clinical handover improvement, the in-depth understanding of the education and training requirements developed through this thesis has provided strong support and guidance to future work.

This thesis has therefore not only answered RQ2, but has also provided strong guidance for national and international work to based upon in regard to clinical handover improvement through the development of standards and education and training.

At a broader level, the research acknowledges that there is a large pool of literature on medical education and education and training in healthcare (Johansson *et al.*, 2011, Van Eaton *et al.*, 2011, Walsh, 2009, Biggs and Tang, 2007, Epstein, 2007, Duncan *et al.*, 2006). The researcher also acknowledges that the process of self-reflection and reflective practice (Muir, 2010, Sandars, 2009, Boyd and Fales, 1983, Kolb and Fry, 1975) have attracted much attention in the field of medical education. It is interesting to note that in this research, it appeared that clinicians required external validation of their practice despite the fact that they used self-reflection as a way to improve their clinical practice. This might be due to the fact that medical education is moving towards a competency based model (Jefferies *et al.*, 2011, Carraccio and Englander, 2004). The researcher however believes that clinical handover is very different as what is currently lacking is what is considered a competent handover and the lack of a standard practice in clinical handover. The insights obtained from this research have highlighted the need for further work in this area to be conducted.

9.2.3 Clinical handover culture is important in clinical handover improvement and the development of a clinical handover culture needs an incremental approach (KF3).

This key finding emerged from the analysis and interpretation of the axial codes *DEPARTMENTAL TRADITION*, *POLICIES AND GUIDELINES*, *EDUCATION AND TRAINING*, *CLINICIAN ROLES* and *HANDOVER CULTURE* within the core category DEPARTMENTAL REQUIREMENTS (see Section 8.2). Further insights contributing to this key finding emerged from the axial codes *INFORMATION* (see Section 8.6.3) and *PRIORITISATION* (see Section 8.6.4) within the core category USER REQUIREMENTS. This key finding provides answers to RQ2 (see Section 9.3.2).

9.2.3.1 Interpretation

While clinical handover culture is important for clinical handover improvement, the development of clinical handover culture is complicated and requires the analysis and understanding of the inter-relationships between *DEPARTMENTAL TRADITION*, *POLICIES AND GUIDELINES*, *EDUCATION AND TRAINING*, *CLINICIAN ROLES* and *HANDOVER CULTURE*. Analysis of the data across the three phases within the core category DEPARTMENTAL REQUIREMENTS (see Section 8.2) showed that *DEPARTMENTAL TRADITION* had a strong influence on *POLICIES AND GUIDELINES*, *EDUCATION AND TRAINING* and *CLINICIAN ROLES* in a clinical handover setting in Phases One and Two. Through this research, clinicians seemed to have developed a better understanding of clinical handover through the process of self-reflection and started to develop a culture of handover. As a result, analysis of the data in Phase Three revealed that there was a transformation from *DEPARTMENTAL TRADITION* to *HANDOVER CULTURE*. It is also important to note that the culture of clinical handover was influenced by the clinical handover guidelines and clinical handover manual as well as the education and training program developed and delivered in Phase Three. Therefore, it can be concluded that guidelines in conjunction with proper education and training in clinical handover play a big role in clinical handover improvement. This is a significant insight into clinical handover improvement.

Looking beyond the relationships between axial codes from one core category revealed a more complicated inter-relationship of axial codes between core categories. Within the core category of *USER REQUIREMENTS* (see Section 8.5), clinicians had indicated their wish to have standardised data fields of issues actions and comments as well as prioritisation of patient care. All of these fields were incorporated into the electronic tool as well as in the training manual. Analysis of the data revealed that clinicians would fill in the fields of issues, actions and comments but prioritisation was not being used appropriately. As a result, all patient were being prioritised as Category 1 requiring urgent attention. It appears that although *DEPARTMENTAL TRADITION* did not emerge as an axial code through analysis of the data from participants in Phase Three, the influence of *DEPARTMENTAL TRADITION* still exists in some ways. In Phases One and Two, information transfer formed a significant part of the clinical handover process and the development of the three different sections in the electronic tool to transfer patient care was only a refinement from the traditional way in which handover was conducted. Clinicians transferred descriptive data about patient care. Prioritisation on the other hand challenged the boundaries of traditional clinical practice. Prioritisation of patient care from one team to the next reduced the clinical autonomy of the receiving team to decide on the urgency of care. As a result, the incoming team was asked to accept the decisions of the outgoing team rather than make their own decisions. This implied that there was a trust issue at play and that the incoming team must trust the

judgement and decisions made of the outgoing team. In circumstances where clinical autonomy was challenged, clinicians reverted back to what they knew as they were unwilling to challenge the tradition of how things were done.

It is therefore very important to note that the development of clinical handover culture is very important in clinical handover improvement but the development of clinical handover culture needs to be incremental. This key finding provides answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3) and will be discussed in relation to available literature in the next section.

9.2.3.2 Discussion

This research has found that clinical handover culture is essential for clinical handover improvement. While the use of tools and techniques might assist in clinical handover improvement, the lack of a clinical handover culture means that often clinical handover does not happen in a way which will achieve the outcomes of a transfer of responsibility and accountability of patient care. The user-centred approach used in this research as well as the development and introduction of the electronic tool have formed part of the strategy to engage clinicians in the development of a handover culture within the hospital. More importantly, it needs to be recognised that the development of a handover culture happens incrementally over a period of time. Clinical handover improvement strategies which require massive changes in the way things were previously done might not be accepted by the clinicians.

The finding that a good clinical handover culture is important in clinical handover improvement is supported by available literature. The culture for clinical handover had been described as one of the most important factors in determining if there is a good handover (McGee-Lennon *et al.*, 2007, Wong *et al.*, 2007, Chacko *et al.*, 2006, Morrison, 2006, Cheah *et al.*, 2005, Van Eaton *et al.*, 2005, Van Eaton *et al.*, 2004, Petersen *et al.*, 1998). There were however very few studies which indicated the emergence of a clinical handover culture as a research outcome and few studies which suggested ways to develop a culture of clinical handover. This is especially the case in the implementation of electronic clinical handover systems.

Kellogg *et al.* (2006) described the process of implementing an electronic tool for clinical handover as part of a strategy for clinical handover improvement but did not examine the culture of clinical handover amongst staff. This was attributed to a few explanations. Firstly, it was difficult to measure handover culture quantitatively. Most of the literature describing the process of implementing an electronic tool for handover utilise quantitative methods to highlight the differences the tool has made in information transfer (Cheah *et al.*, 2005, Van Eaton *et al.*, 2005, Van Eaton *et al.*, 2004, Petersen *et al.*, 1998). There was no mention of handover culture. Some tools had been developed and validated to measure the culture of patient safety (Singer *et al.*, 2007, Sexton *et al.*, 2006, Gershon *et al.*, 2000) but to the best of the researcher's knowledge, there was no tool available to quantitatively measure handover culture. It was also interesting to note that despite the recognition of the importance of developing a clinical handover culture, there were no strategies available on how to develop or improve clinical handover culture (Wong *et al.*, 2008).

This research has illustrated that it is possible to develop and improve handover culture by adopting a user-centred approach in understanding clinical handover and clinical handover

improvement (see Section 8.2.5). While the development of handover culture cannot be attributed to one single activity, it is likely that the combination of engaging with the end-users on different levels, education and training, as well as the implementation of the electronic clinical handover support tool had resulted in the development of a culture of handover at the end of Phase Three.

This research has also illustrated that it is difficult to research and analyse the emergence of culture and cultural change. This was only achieved through analysing and integrating the data throughout the three phases and therefore a multi-snapshot or a longitudinal approach is required. While this research suggests that clinical handover culture can be one of the outcomes in clinical handover improvement, the subtlety of the emergence of clinical handover culture as discussed in Section 9.2.4.1 means that an in-depth analysis of the data is required to understand the emergence of handover culture.

More recent literature had again emphasised the importance of clinical handover culture (Catchpole *et al.*, 2010, Horwitz *et al.*, 2009), and it was likely to be the most important factor in determining the practice of clinical handover. When considering different factors which impact on the efficiency and effectiveness of the clinical handover process, it is easy to identify and provide solutions for environmental factors and develop tools to assist in clinical handover. The solutions to the development of clinical handover culture which has been deemed as most important remains unclear. This thesis has contributed significantly to the knowledge of clinical handover by describing a user-centred approach which can create a good clinical handover culture over time. In doing so, this key finding provides answers to RQ2 (see Section 9.3.2).

There is a large pool of literature outside the clinical handover domain which discusses organisational culture and clinical culture (Boan and Funderburk, 2003, Fisher and Alford, 2000). A summary of the impact of clinical culture and organisational culture has been provided by (Boan and Funderburk, 2003). The relationships between organisational culture and quality and safety in healthcare have been described but there was little discussion of how to achieve the organisational culture required for quality and safety (Zboril-Benson and Magee, 2005, Aiken *et al.*, 2002, Clark, 2002). While this research has focused in clinical handover, this key finding has indicated that handover culture is important and that it is important to consider incremental change in the development of a handover culture. On a broader context of quality and safety, this research has contributed to the discussions of culture by indicating that an in-depth analysis of the data is required to understand clinical practice and the influence of department tradition and culture.

9.2.4 The understanding of clinical handover among clinicians varies and this variability in understanding has significant impacts on clinical handover behaviours of individual clinician and clinical handover practice (KF4)

This key finding emerged from the analysis and interpretation of the axial codes *UNDERSTANDING* (see Section 8.3.1) and *EXPECTATIONS* (see Section 8.3.2) within the core category PARTICIPANT ATTRIBUTES. This key finding contributes to KF1 (see Section 9.2.1), KF3 (see Section 9.2.3) and KF7 (see Section 9.2.7) and provided answers to RQ1 (see Section 9.3.1) and RQ2 (see Section 9.3.2).

9.2.4.1 Interpretation

KF1 (see Section 9.2.1) relates to the variability in the understanding of clinical handover amongst clinicians and how this influences the behaviour of individual clinicians in their practice of clinical handover. From the data analysis within the core category *PARTICIPANT ATTRIBUTES*, it became apparent that the understanding of clinical handover was highly variable amongst clinicians especially in Phases One and Two. However, there were commonalities identified which indicated that clinical handover was about the transfer of information. Clinicians who did not attend or participate in clinical handover also believed that clinical handover needs to provide information transfer. Through this research, clinicians explored the meaning of clinical handover within their own context and Phase Three showed an emerging consensus that clinical handover was about the transferability and responsibility of patient care. While there were still differences in the clinicians' understanding of what clinical handover really was, the underlying commonality strengthened and consequently the influence of the behaviour of each clinician at clinical handover weakened from Phases One to Three. This could be attributed to a few reasons. Firstly, the evolving understanding of clinical handover could be due to the changes in the awareness of clinical handover and the national guidelines published by the Australian Medical Association (Australian Medical Association, 2006a) and British Medical Association (Junior Doctors Committee, 2004). Secondly, the changes in the understanding of clinical handover could also be due to the introduction of the electronic tool itself which required that clinicians enter information in pre-determined fields (see Section 6.5.3) and therefore in the process reinforced the understanding of the transfer of responsibility and accountability in patient care. Finally, this could also be due to clinicians self-reflecting on their practice due to their participation in this research conducted to understand clinical handover and clinical handover improvement and realising that the transfer of information was really to facilitate the transfer of responsibility and accountability in patient care.

It is also important to note that the variability in the practice of clinical handover spans beyond individual clinician related factors. While clinicians focussed on discussing their own understanding of clinical handover and its impact on the practice of clinical handover, some interesting observations emerged. The most interesting observation is the fact that morning and night handover had changed from Phases One to Three (see Section 7.2.4.4). Evening handover however remained adhoc and variable. This was despite the fact that clinical handover guidelines and the clinical handover manual had been developed, education and training had been provided and the fact that clinicians had expressed a clear desire to improve clinical handover through a better understanding of the continuity of patient care.

The lack of attention to clinical handover leading to variability in clinical handover practice during evening handover was the result of a conflict between a clinician's desire to improve their practice and their immediate instincts when faced with the demands of the work environment. During evening handover, clinicians only need to take over the responsibility of patient care for a short duration (i.e. 5:00pm – 10:00pm). There was also usually no one around to ensure that evening handover happened and happened in the way in which it was supposed to. This had then resulted in the demands of clinical work taking precedence over attending evening clinical handover sessions as clinicians would rather complete the tasks during their shift then hand them over to their peers to ensure that they were seen as competent in their jobs (see Section 8.4.1).

Morning handover however occurred in a different way. Morning handover facilitated the permanent transfer of patient care from one team to the next. Morning handover was also attended by many more clinicians (including consultants) and clinicians felt the need to provide a good handover to the next team as a demonstration of their competence. As a result, ensuring that a good handover was conducted in the morning was important as it was a reflection of their performance in the work environment.

Night handover was again different from evening and morning handover as night handover meant that clinicians needed to take on the temporary responsibility of patient care for a longer period of time as when compared with evening handover. Night handover also meant that clinicians had to have a more thorough understanding of the background of the patient and what might be required as consultant support was not as readily available during the night and hence the handover process needed to cater for this.

This key finding indicates that the understanding of clinical handover amongst clinicians varies but what impacts on this understanding is the balance between a clinicians' dedication to the process and the demands of their work environment and the need to be viewed as competent by their consultants and by their peers. This provides answers to RQ2.

9.2.4.2 Discussion

This research has revealed that participants have a different understanding of clinical handover and these differences in understanding contribute to the differences in the practice of clinical handover. It was found that there were some commonalities in and amongst the variability in the understanding of clinical handover. A difference in the understanding of clinical handover had also been established over Phase One to Phase Three with emerging commonalities. This understanding of clinical handover amongst clinicians influences the practice of clinical handover. This finding is further discussed in relation to the available literature.

Firstly, it was interesting that the differences in the understanding of clinical handover and expectations in clinical handover amongst clinicians had not been clearly described in the available literature. Clinical handover is often viewed as a homogenous entity with the understanding that it is an information transfer process (Wong *et al.*, 2008, Talbot and Bleetman, 2007, Australian Council for Safety and Quality in Health Care, 2005). This narrow understanding of clinical handover has led to studies being conducted which aim to improve clinical handover with a focus on improving information transfer as an outcome. This is evident in the literature which examine the impact of an electronic clinical handover system to measure information flow as the final outcome to determine the success of handover (Cheah *et al.*, 2005, Petersen *et al.*, 1998). Another study described a scenario in which information was lost through the process of a verbal handover and argued that physically handing over a printed sheet improved handover, defining handover purely on the basis of information transfer (Bhabra *et al.*, 2007).

A more recent examination of the definition of clinical handover states that the emphasis is on the transfer of responsibility and accountability in patient care. The British Medical Association, the Australian Medical Association (Australian Medical Association, 2006b) and more recently, the OSSIE Guide (Australian Commission on Safety and Quality in Health Care, 2010) emphasised the responsibility and accountability of care transfer. Information transfer was not part of the

definition of clinical handover. The definition which is now widely accepted as the definition of clinical handover is

“the transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent basis”

As such, information transfer at clinical handover should really serve the purpose of ensuring continuity of patient care. The literature published after data collection and analysis favours the definitions proposed above (Cohen and Hilligoss, 2010, Jorm *et al.*, 2009). While there still appears to be some variability in the definition of clinical handover, the emphasis on clinical handover has shifted from information transfer to transferring the responsibility of patient care (Cohen and Hilligoss, 2010).

It should be noted that the national guidelines on clinical handover developed by the Australian Medical Association was distributed to all clinicians in Australia in between Phases Two and Three of this research. This could partly offer one explanation for the change in the understanding of clinical handover in our research as it would be reasonable to assume that the guide had increased the clinicians' awareness of clinical handover being about the transfer of responsibility and accountability.

Secondly, the user-centred approach used in this research appeared to also have contributed to the understanding and practice of clinical handover amongst the clinicians. There was no literature in the field of clinical handover which had investigated using a user-centred approach and the impact this had on creating a change in the understanding of clinical handover.

Thirdly, the change in the understanding of clinical handover amongst clinicians might be an outcome of the introduction of the electronic tool. Studies reported in the literature that discuss the implementation of an electronic clinical handover system have not clearly documented changes in the understanding and expectations of clinical handover as one of the outcomes. Some have argued an improvement in information transfer (Raptis *et al.*, 2009, McGee-Lennon *et al.*, 2007, Cheah *et al.*, 2005), improvement in user's perception of handover (McGee-Lennon *et al.*, 2007, Morrison, 2006, Van Eaton *et al.*, 2005) and improvement in education and training (Chacko *et al.*, 2006). The differences in what is described in this thesis and what is covered in the literature can be attributed to several reasons.

Firstly, many electronic clinical handover systems are designed without the requirements of signing on and off with each action required to be undertaken (Raptis *et al.*, 2009, Morrison, 2006, Cheah *et al.*, 2005). The electronic tool developed in this thesis was designed with this in mind based on feedback obtained from the focus groups and design workshops. As such, the electronic tool served as a reminder and to some extent acted as an educational tool to further the clinicians' understanding of clinical handover. Secondly, it was possible that different clinician groups had different requirements and a different understanding of the process within their own context which could also be why this issue was not brought up by other studies. Thirdly, it was unclear as to how clinicians were involved in many of these studies or whether they were even involved at all in the development of the electronic clinical handover system. This research has

provided significant insights into using a user-centred approach in exploring clinical handover and clinical handover improvement and has demonstrated that it could change the understanding and expectations of clinical handover amongst clinicians.

This key finding identifies a relationship between changes in the understanding of clinical handover amongst clinicians and their actual practice of clinical handover. There was no literature that discussed this important finding. Within a broader context of quality and safety, (Gagne and Deci, 2005) have found that a clinician's behaviour was influenced by external pressures and an internal recognition for improvement. This research has therefore generated significant understanding in regard to the potential relationship of understanding and practice in the context of clinical handover.

9.2.5 The strongest personal attributes which impact on clinical handover and clinical handover improvement are cultural background and individual personalities (KF5).

This key finding emerged from the integrated analysis and interpretation of the axial codes *CULTURAL BACKGROUND* (see Section 8.3.5) and *INDIVIDUAL PERSONALITIES* (see Section 8.3.3) from the core category PERSONAL ATTRIBUTES. This key finding contributes to KF6 (see Section 9.2.6) and answers RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

9.2.5.1 Interpretation

This research has found that participant attributes play a significant role in clinical handover by influencing the behaviours of participants themselves and other participants during clinical handover. This seemed to be a sensitive topic and was not often raised by clinicians in their semi-structured interviews and also in the literature. Participant attributes which emerged to be of significance in this research were the cultural background of clinicians and their personalities. It was found through observations that both of these attributes had a significant influence on each clinician's behaviour and the behaviour of other clinicians at clinical handover but did not come across strongly in the interviews conducted.

Cultural background appeared to have the strongest influence on face-to-face clinical handover sessions although clinicians were very cautious about highlighting this in their interviews. Clinicians were evidently aware of the problem as a few provided very carefully worded replies during the interviews and focus groups. Observation data also clearly documented the clinician's reactions at clinical handover sessions. Clinicians seemed to acknowledge the fact that they had to function in an imperfect system. However, participants were extremely verbal in regard to the influence of individual personalities on understanding, expectations and behaviour. This suggested that it was an important area to consider in clinical handover improvement.

There are a few plausible reasons as to why clinicians did not comment much on cultural background in their interviews. Firstly, clinicians are highly supportive of their peers and can understand the difficulties faced by clinicians of different cultural background and try to support them in their clinical practice. Secondly, clinicians want to appear to be politically correct by being inclusive of clinicians from different cultural backgrounds. Finally, clinicians might see no reason to discuss this as they do not feel that it is within their control or that anything can be done with regards to this in clinical handover improvement.

However, it was interesting that clinicians readily highlighted the fact that certain individuals with certain personalities had a significant influence on clinical handover. They believed that some clinicians required to change their personalities and behaviour at clinical handover in order to improve clinical handover. It was also worth noting that clinicians with individual personalities that influenced clinical handover were consultants. This could be due to the fact that clinicians had no issues discussing individual personalities as it refers to only an individual as opposed to a group of individuals. However, when it came to cultural background, it meant stereotyping a certain group of clinicians and as such, clinicians highlighted individual personalities as an issue influencing clinical handover which should be considered in clinical handover improvement and not cultural background.

The research also showed that the introduction of the electronic tool minimised the influence of cultural background and individual personalities on clinical handover. It should also be noted that the electronic tool introduced did not replace current clinical handover practices but supported it by offering an alternative media for the transfer of information and patient care. Therefore, as long as face-to-face meetings are part of the clinical handover process, individual personalities and cultural background will always influence clinical handover and clinicians have indicated that face-to-face discussions at clinical handover was the most important part in clinical handover. As a result, this research argues that the introduction of the electronic tool to provide support will reduce the influence of individual personalities and cultural background on clinical handover but will not eradicate these influences. This key finding provides answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

9.2.5.2 Discussion

This research has revealed that individual personalities and cultural background influence clinical handover. This finding is further discussed in relation to the available literature below.

While this has emerged as one of the key findings in this research, individual personalities and cultural background have not been clearly discussed in the literature as part of factors that impact on clinical handover improvement. While there was some mention of personal factors that impacted on clinical handover (Australian Council for Safety and Quality in Health Care, 2005), there were no clear systemic studies provided to support and explain this. Turner *et al.* (2006) provided a discussion about the importance of organisational, environmental and human factors and the inter-relationship between these factors impacting on clinical handover but did not emphasise the significance of cultural background within human factors.

This is an interesting finding as the Australian healthcare system is heavily dependent on international medical graduates many of whom come from culturally diverse backgrounds (National Health and Hospitals Reform Commission, 2009). Many other industrialised nations also face similar issues of shortage of healthcare workers and an increasing number of international medical graduates who enter into their workforce to sustain their healthcare system. There was little mention about the impact of international medical graduates on clinical care provision in the literature as the literature focused mostly on how to facilitate a better transition for international medical graduates into the local workforce. Most certainly, there has been no literature published in relation to the implications of culturally diverse international medical graduates on

clinical handover (Cohen and Hilligoss, 2010, Matic *et al.*, 2010, Wong *et al.*, 2008). This research has found that cultural background has a great influence on clinical handover and is an area that warrants further investigations.

The available literature also did not discuss the impact of an electronic tool on personal attributes or cultural background (Ryan *et al.*, 2011, Raptis *et al.*, 2009, McGee-Lennon *et al.*, 2007, Chacko *et al.*, 2006, Morrison, 2006, Cheah *et al.*, 2005, Van Eaton *et al.*, 2005). This was likely due to the fact that many of the electronic clinical handover systems were developed with a view to replace the current handover practice and not support it. It was also unclear from the available literature as to whether their clinical handover practice involved face-to-face discussions.

In the medical error literature, medical errors and quality and safety improvement is seen as a system issue. Personal attributes while acknowledged as being a contributing factors, have not been seen as a significant aspect of quality and safety improvement (Thrall, 2004). While there has been focus placed on international medical graduates, the focus has been more on how the system can help with international medical graduates' transition into the local health care system. An extensive Australian research into international medical graduates and cultural background recommended training for international medical graduates as well as better systems put on place to help with their adaptation (Laurence, 2007). This research had found that cultural background plays a significant role in how they do their work. This was obtained primarily through the use of observations as clinicians appeared reluctant to discuss this. The issue of avoiding discussions about the impact of cultural background and international medical graduates had been pointed out in a review of a major incident in Australia (Harvey and Faunce, 2006) who indicated that "this topic is controversial, not the least because of the growing importance of overseas trained doctors (OTDs) in maintaining basic health services in some areas of Australia but also due to the difficulty of teasing genuine quality and safety problems in this context from possible racial or xenophobic concerns" (Harvey and Faunce, 2006). This research contributes significantly to the broader context of quality and safety by highlighting the issues related to cultural background and international medical graduates.

9.2.6 Various factors influence clinical handover and it's the nature of these factors in relation to team dynamics which influence clinical handover (KF6).

This key finding emerged from the analysis and interpretation of axial codes *POLICIES AND GUIDELINES*, *CLINICIANS ROLES*, *EDUCATION AND TRAINING*, *DEPARTMENT TRADITION*, *HANDOVER CULTURE* within the core category DEPARTMENTAL REQUIREMENTS (see Section 8.2), axial codes *UNDERSTANDING*, *EXPECTATIONS*, *INDIVIDUAL PERSONALITIES*, *COMMUNICATION STYLE*, *CULTURAL BACKGROUND*, *BEHAVIOUR* within the core category PARTICIPANT ATTRIBUTES (see Section 8.3) and axial codes *WORKLOAD*, *VENUE*, *DISTRACTIONS*, *NUMBER OF PARTICIPANTS*, *TEAM DYNAMICS*, *IT INFRASTRUCTURE AND SUPPORT* within the core category ENVIRONMENTAL CONSIDERATIONS (see Section 8.4). This key finding relates to KF5 (see Section 9.2.5) and provides answers to RQ2 (see Section 9.3.2).

9.2.6.1 Interpretation

The key finding that emerged from these three core categories is that various different factors affect clinical handover and in particular the team dynamics during clinical handover which affect

the efficiency and effectiveness of clinical handover. These include organisational factors, environmental factors and individual factors. When each phase was analysed on its own, it appeared that the inter-relationship amongst all of these factors was a significant finding as that determined the efficiency and effectiveness of clinical handover. However, when all the three phases were analysed and interpreted together, it was found that while various factors affect clinical handover, the influences of some of these factors had changed (e.g. Education and training, distractions), some factors had been added (e.g. IT/IS considerations) and some factors had been removed (e.g. Department tradition) from Phases One to Three. The electronic tool had added another layer of complexity to the factors which influenced clinical handover in Phase three. In addition, other factors like communication styles had been changed to being quite varied to relatively uniform from Phase One to Three through the use of the electronic tool. Yet, the most significant factors i.e. workload (see Section 8.4.1), individual personalities (see Section 8.3.3) and cultural background (see Section 8.3.5) continue to have a significant influence on clinical handover and there were not changes to these factors through the three phase. What is more interesting to note is the reaction from clinicians through the interviews and the observation sessions which provided insights into how these factors are dealt with by clinicians. Clinicians have tried to manage workload collectively by handing over a manageable workload to the incoming team. Clinicians however have chosen to ignore the influence of cultural background and to some extent the influence of individual personalities on clinical handover.

Interpretation of this data together with the observations and informal discussions with clinicians outside of the formal data collection process have led to a conceptual understanding of factors which affect clinical handover and how these insights could assist in clinical handover improvement. Clinicians are a collegial group of individuals who deliver clinical care collectively. This collegiality and social belonging within the medical culture has a high priority in functioning within the medical environment. This research has found that clinical handover improvement insights obtained from the interviews reflect on what changes would be deemed most acceptable to most clinicians. Environmental factors such as venue, distractions and the number of participants has been voiced by many clinicians and therefore a change in their influence can be seen from Phases One to Three. Their involvement in the development of an electronic tool is seen as a collective effort and therefore was seen as an important solution for clinical handover improvement.

This understanding is further strengthened by how clinicians manage their workload and its influence on clinical handover. Clinicians work in a chaotic environment and they manage this chaos collectively through a division of tasks in order to present a more manageable work environment. As a result, when the workload is not too heavy, clinicians prepare a good handover to the incoming team to reflect a well managed work environment. When clinicians are faced with a heavy workload, they tended to complete the tasks at the end of their shift or stayed behind after handover to complete the tasks to so that they could present a manageable work environment to the incoming team.

This understanding could also provide explanations as to why clinicians did not acknowledge or address the fact that individual personalities and cultural background had a significant influence on clinical handover. In order to deal with issues relating to cultural background and individual

personalities, they would have to break away from the collegial environment and address these issues individually.

The above finding has significant implications for research into clinical handover and clinical handover improvement. The first important point is that one single data collection technique will not reveal all the important insights for clinical handover improvement. A combination of data collection techniques which include observations is important. The second important point to note is that data collected in a single snapshot will not reveal these significant findings. A multi-snapshot approach should be adopted over a period of time to allow for the emergence of key findings. Finally, it is the involvement of a researcher who is external to the medical culture that allows for the revelation of this key finding. While this key finding helps in understanding clinical handover, a more important finding is the collegial nature of clinicians as a group that forms insights for clinical handover improvement within the Department of General Internal Medicine.

9.2.6.2 Discussion

This research has found that various factors affect handover and within each phase it has also found that the inter-relationship amongst these factors had more influence on clinical handover than each individual discrete factor. However, upon analysing the data throughout the three phases, this research concludes that it is the diverse nature of the factors which influence team dynamics that determines the influence of the factors on clinical handover. The factors which affect clinical handover has been classified as departmental requirements, environmental considerations and participant attributes as described in each of the three core categories. Environmental considerations only serve to facilitate a good handover as a good handover does not occur in a good environment without clinicians. The clinicians and the role they play in clinical handover ultimately dictate the practice of clinical handover. Analysis of the data has indicated that human influences are very important in ensuring that the facilitators are fully utilise to enable a good handover to occur. This section discusses this key finding in relation to the available literature.

This research has contributed significantly to the clinical handover literature as it has identified the factors which influence clinical handover as well as demonstrated how these factors influenced clinical handover. It is important to note that previous attempts to identify factors that impact on clinical handover have largely been based on case studies and examples from other high risk industries. A literature report by the Australian Council for Safety and Quality in Health Care (2005) categorised factors that impact on clinical handover as system design factors, organisational cultural factors and individual factors (Australian Council for Safety and Quality in Health Care, 2005).

A review about system design and environmental factors revealed that there were requirements for well formed policies, legislations and supervision for handover to function appropriately as it occurred within a context of complex healthcare delivery (Priest and Holmberg, 2000). The systemic design factors which were reported to have an impact on clinical handover included education and training in communication (Shrake *et al.*, 1994), specialist roles to assist communication (Litzinger and Rohde Boehler, 1997), structures to assist joint clinical decision making (Zwarenstein and Bryant, 2000), documented care planning process (Menke *et al.*, 2001)

and medication management (Schlienger *et al.*, 1999). While the Australian council for safety and quality in health care (2005) have included these articles under clinical handover, it should be noted that they were more relevant to communication, care planning and documentation rather than clinical handover.

The literature available at the time this research was conducted did not really identify any organisational factors which influenced clinical handover. The literature review conducted by the Australian Council for Safety and Quality in Healthcare (2005) identified three papers which described organisational cultural factors which impact on handover. McKnight *et al.* (2001) examined the communication needs and information sharing for physicians and nurses within a hospital setting. Canatsey *et al.* (1994) described a case study of a psychological patient with an adverse event and the main issue raised in the impact of a written care plan. Patterson *et al.* (1995) described information needs for nursing handover. These papers really did not identify factors which impact on clinical handover from an organisation level. This can be attributed to the lack of literature on the topic, especially in the area of clinical handover amongst medical professionals.

The literature review by the Australian council for safety and quality in health care (2005) identified individual factors as the third category of factors that impacted on the effectiveness and efficiency of clinical handover. These included inaccurate assessments (Beach *et al.*, 2003, Priest and Holmberg, 2000), incomplete information transfer during peri-operative handover (Anwari, 2002) and the physical status of doctors involved in prescription errors (Dean *et al.*, 2002). Out of these, only Anwari (2002) discussed handover between medical to nursing staff within the peri-operative service environment. Dean *et al.* (2002) attempted to investigate the factors associated with prescribing errors. Beach *et al.* (2003) and Priest and Holmberg (2000) described case studies in which there was an inaccurate diagnosis and assessment which impacted in patient outcomes. Individual factors which impacted on clinical handover were not been clearly characterised and identified.

This research has contributed significantly to knowledge by identifying factors which influence clinical handover. More importantly, at the completion of Phase One, the preliminary findings from this research argued that it was the inter-relationship of factors that was as important if not more important in determining the effectiveness and efficiency of clinical handover than each individual discrete factor (Turner *et al.*, 2006). It is interesting to note that recent literature in the field of clinical handover has started to identify various factors and the interplay of these factors which impact on clinical handover. The Australian Medical Association have referenced this research to support the fact that various factors and their interrelationships impact on clinical handover (Australian Medical Association, 2006b). Horwitz *et al.* (2009) have concluded that various technical and cultural factors are important issues to consider in clinical handover improvement. Catchpole *et al.* (2010) have concluded that multiple factors impact on clinical handover and there was a need to address cultural factors. This has led to suggestions that clinical handover solutions need to take into account local factors and the local setting (Australian Commission on Safety and Quality in Health Care, 2010, Cohen and Hilligoss, 2010) which is a validation of the preliminary findings first reported in this research.

Another finding which has emerged upon completion of the three phases in this research is the fact that while the inter-relationships amongst the factors are important, what is more important is the actions undertaken by clinicians with regards to these factors in clinical handover improvement. Factors that were identified which could be managed collectively by clinicians have been changed to improve clinical handover by Phase Three. Factors which will cause a divide amongst clinicians were not managed or even mentioned by clinicians despite the fact that they continued to have a significant impact on clinical handover. This has not been previously reported in the literature. This key finding has therefore contributed significantly to knowledge in the field of clinical handover improvement and provided answers to RQ2 (see Section 9.3.2).

It is interesting to note that in this research, the collegiality of clinicians have both a positive and negative impact to clinical handover and more broadly, quality and safety of care. Collegiality amongst clinicians have not been discussed much in the quality and safety domain. In a study of physicians, collegiality while useful appeared to have a negative impact on quality and safety and contributed to resistance to change (Smalarz, 2006). This is an interesting area which warrants further research.

9.2.7 There is a significant difference between perceived handover and actual handover which has a significant impact on clinical handover improvement (KF7).

This key finding emerged from the analysis and interpretation of the axial codes ATTENDANCE (see Section 8.5.1), STRUCTURE (see Section 8.5.4) and INFORMATION TRANSFER (see Section 8.5.5) within the core category of CLINICAL HANDOVER EXPERIENCES. This key finding relates to KF9 (see Section 9.2.9), KF10 (see Section 9.2.10) and provides answers to RQ2 (see Section 9.3.2).

9.2.7.1 Interpretation

There were differences found between perceived and actual handover. However, these differences were more clearly detected in Phase One of the research and were very much less so in Phase Two. In Phase Three, the data did not demonstrate a difference between perceived and actual handover. It is important to note the differences between perceived and actual handover highlighted most obvious amongst consultants.

This was likely related to the multi-factorial and multi-perspective understanding of the practice of clinical handover. The differences between Phases One through to Three could be explained by a few reasons. Firstly, consultants were only interviewed in Phase One. In Phases Two and Three, only registrars and interns were involved in the data collection process. The main differences between perceived and actual handover were mainly detected in consultants and as such could explain the difference. Further analysis of the data also suggested that interns and registrars had some differences in their perceived and actual handover practices. This could be attributed to the contextual environment in the timing of data collection. In Phase One, clinical handover was not a commonly discussed clinical practice and as such clinicians did not pay much attention to the process of clinical handover including their own behaviour and activities which occurred at clinical handover. By Phase Three however, the researcher had become widely known in the department and clinical handover had also been discussed widely nationally and internationally. Involving final year medical students in the design of the electronic tool before they became interns in Phase

Three also played a role. As a result, clinicians paid more attention to clinical handover and therefore had the ability to understand their clinical handover practice better.

This research also found significant differences between perceived and actual clinical handover practice especially amongst consultants. This can be attributed to the fact that consultants do not participate fully in clinical handover. Consultants only attend the morning handover sessions and this research has already highlighted that morning sessions occur differently from evening and night handover sessions (see Section 4.3.1.4). Consultants also want to portray a good image of clinical handover and as a result suggest that clinical handover is an organised and structured process rather than describe the actual process itself.

This finding posed significant challenges for the researcher. In attempting to understand the practice of clinical handover from the clinicians' perspective, the researcher also needs to recognise that what clinicians say can be different to what they do. To overcome this problem, observation sessions are essential in providing an in-depth understanding of the practice of clinical handover. This key finding relates to KF9 (see Section 9.2.9) and KF10 (see Section 9.2.10) and provides answers to RQ2 (see Section 9.3.2).

9.2.7.2 Discussion

This research has found that significant differences exist between what clinicians perceived to be the practice of clinical handover and the actual practice of clinical handover and they do not seem to be aware of this conflict. This finding is discussed in relation to the available literature.

There was no mention of the differences between perceived and actual handover in a review of the clinical handover literature apart from a publication from this research (Wong *et al.*, 2007). However, when viewed from a broader context of clinical processes, this finding has been well described in the literature.

Firstly, Denzin and Lincoln (2005) described the issues arising out of the differences in perceptions and actual observations. This description however was more related to the discussion of research methodologies rather than clinical processes. Wears and Berg (2005) also described the differences between findings obtained through observations and findings obtained through interviews. By using video observations, it was recently found that clinicians might not be fully aware of what they actually do, and it is important to explore the differences between what they say they do, what they think they do and what they actually do (Nohr and Botin, 2007, Nøhr and Botin, 2007). These issues were important and had to be taken into account in the design of the electronic tool in this research. Within the clinical handover literature, there had been no acknowledgement of the differences between perceived handover and actual handover. Wong *et al.* (2007) has since documented this through data collected from this research. There was therefore little guidance available as to how these issues should be considered in developing an electronic tool for clinical handover. The researcher had to adopt what she thought was an appropriate approach taking into account the differences between perceived and actual clinical handover in the development of the electronic tool in this research and this approach should be considered in the future development of IT systems in healthcare.

The differences between perceived and actual clinical handover might reflect the variability in the understanding of clinical handover (see Section 9.2.4). This partly explains why clinical handover serves different functions (see Section 9.2.5) and why clinicians find it difficult to articulate user requirements for clinical handover improvement (see Section 9.2.9). This finding further emphasises the importance of adopting a user-centred approach in understanding clinical handover and clinical handover improvement.

9.2.8 Clinical handover serves various different functions and these functions changed after the introduction of electronic clinical handover support tool (KF8).

This key finding emerged from the analysis and interpretation of the axial codes of *SUPPORT* (see Section 8.5.2), *EDUCATIONAL COMPONENT* (see Section 8.5.3) and *INFORMATION TRANSFER* (see Section 8.5.5) from the core category of CLINICAL HANDOVER EXPERIENCES. This key finding relates to KF9 (see Section 9.2.9), KF10 (see Section 9.2.10) and provided answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

9.2.8.1 Interpretation

Clinical handover serves different functions and these functions evolve through the three phases. The first and most important function of clinical handover is the emphasis on transferring responsibility and accountability of patient care. In Phase One, clinicians emphasised the need to transfer information whereas by Phase Three, clinicians had emphasised the need to exchange information in order to transfer responsibility and accountability in patient care. This change in the understanding of the primary function of clinical handover could be due to a variety of factors. Putting this in context, the first possible explanation for this change is that the available literature in Phase One emphasised information transfer. While it was unclear as to whether clinicians actually read the available literature, that appeared to be the consensus at that time. This was similar in Phase Two. In Phase Three, national and international guidelines had emphasised the transfer of responsibility and accountability of patient care. Some of the participants in this research were involved in the development of the national guidelines and therefore the change might be due to the changing understanding of clinical handover both nationally and internationally.

A more plausible explanation of the evolving and changing nature of the primary function of clinical handover is the self-reflection process that clinicians underwent in order to provide suggestions to the researcher for clinical handover improvement through participation in interviews, observation sessions, focus groups and design workshops. The electronic tool had also helped clinicians visualise the abstract concept of the transfer of responsibility and accountability to one which was more tangible which clinicians could more easily relate to.

Clinical handover was also found to serve various secondary functions such as providing support and an educational component for clinicians. These functions had changed from Phases One to Three. In Phase One, the functions that clinical handover served seem to cover a wide variety of different aspects ranging from supporting better patient care such as providing supervision and second opinions to improving the well-being of clinicians such as debriefing and socialisation. In Phase Three, many of these secondary functions, especially those which did not have much

relation to direct patient care no longer formed part of clinical handover. While it could be argued that these changes were due to the introduction of the electronic tool resulting in changing the dynamics of the practice of clinical handover, this change needs to be considered in greater detail. Data collected from Phase One revealed that clinical handover often occurred in different locations e.g. clinical handover room, kitchen, on the couch in front of the television. Clinicians arrived for clinical handover at the start or the end of their shift and the locations chosen were often the ones where they felt comfortable and relaxed while waiting for their peers. As a result, they often discussed their life outside work with their peers during the time allocated for clinical handover and therefore the secondary functions of clinical handover seemed to include support and socialisation outside of work. By Phase Three however, the introduction of the electronic tool meant that clinical handover more often than not occurred in front of the computers or close to the computers in clinical handover room and clinicians were observed to discuss other issues outside the clinical handover room before entering the room to handover patient information.

There could be two possible explanations for this observation. Firstly, it could be attributed to the fact that clinicians now understand the importance of clinical handover and therefore concentrate on patient care during the time allocated for clinical handover. An equally valid explanation might be the boundaries imposed when clinical handover was restricted to the clinical handover room. In Phase One, it was observed that time and space were not well defined in clinical handover. In Phase Three, clinicians were restricted to conducting clinical handover in the clinical handover room because of the electronic tool and it was observed that clinicians did their socialising outside the handover room and outside of the handover session. This was interesting as many of the clinicians interviewed did not highlight these functions in their interviews. It is the researcher's belief that this is a good outcome for clinical handover as long as the social support which used to be provided during clinical handover time is continued and being achieved through other means.

9.2.8.2 Discussion

This research has found that clinical handover serves various functions apart from information which directly and indirectly impact on patient care. Some of these functions directly impact patient care while other functions indirectly impact patient care through improving the knowledge, skills and well-being of clinicians. The functions of clinical handover had changed from Phases One to Three after the introduction of the electronic tool. This finding is further discussed in relation to the available literature.

Preliminary findings from this research had found that clinical handover serves multiple functions and these findings were published initially (Turner *et al.*, 2006). These findings were later echoed by the Australian Medical Association guidelines on clinical handover (Australian Medical Association, 2006b). Some of these functions that clinical handover serves had been described by others in the nursing handover literature. The functions for nursing handover included the education and training of nurses during handover (O'Connell and Penney, 2001, Lally, 1999), the understanding of competency of staff (Wolf, 1989) during the next shift as well as to act as emotional support for nurses (Kerr, 2002, Strange, 1996). However, prior to this research the various functions of clinical handover in a medical setting had not been described.

More recently, there has been more literature that discusses some of the various functions of clinical handover in the context of medical practitioners (Cohen and Hilligoss, 2010). Clinical handover, especially in the form of a morning report was found to support the role of education and training in a survey conducted in Australia (Fassett *et al.*, 2007). A small survey study in the US showed that the educational value of handover was important in assisting patient care (Stiles *et al.*, 2006). Recent publications investigated the emotional support provided through clinical handover routines but both studies were performed using nurses as participants (Younge, 2008., Evans *et al.*, 2008). These recent literature have confirmed this key finding of clinical handover serves various functions.

Despite the recognition that clinical handover serves various functions, little attention was paid in the literature in regard to impact of an electronic tool on the functions of clinical handover or the changing nature of functions in clinical handover practice. This could be due to a different evaluation framework adopted by others. The functions of clinical handover might also be different in other hospitals. This research has found that while the electronic changed some of the functions in regard to clinical handover, many functions remained the same. This was probably due to the fact that the electronic tool was built as a support tool rather than a replacement of current clinical handover practices and the in developing the tool, the researcher was sensitive to the fact that the electronic tool should not take away the positive functions of clinical handover.

This thesis has found that the electronic tool had provided an alternative medium for the transfer of information, responsibility and accountability. It also found that the electronic tool contributed to the change of understanding of clinicians from the transfer of information to exchange of information for continuity of patient care. The electronic tool had also improved the process of discussion about patients and supervision of junior clinicians. Poor clinical supervision of junior clinicians is often quoted as the reason behind adverse events in healthcare (Kohn *et al.*, 1999, Wilson *et al.*, 1999). By providing asynchronous support, the electronic tool could possibly have a significant impact on the quality and safety in the delivery of healthcare. While the functions of providing support such as debriefing and de-stressing were marginalised after the introduction of the electronic tool, participants had developed other mechanisms for these purposes. Any future developments and implementation of an electronic clinical handover support system should take into consideration its impact on the existing functions of clinical handover so as to not to “throw the baby out with the bath water”.

This research further suggests that solutions aimed at improving clinical handover should not replace face-to-face communication as it is advantageous to the participants to have face-to-face communication which impacts both directly and indirectly on patient care. This is an area that warrants further research.

9.2.9 An over-arching user-centred approach is important to engage all users before conducting user requirements for the development of an electronic tool (KF9).

This key finding emerged from not only from analysis and interpretation of all the core categories but also from the methodology adopted. The main core categories which contributed to this key

finding in include DEPARTMENT REQUIREMENTS (see Section 8.2), CLINICAL HANDOVER EXPERIENCE (see Section 8.5) and USER REQUIREMENTS (see Section 8.6). This key finding relates to KF10 (see Section 9.2.10) and KF11 (see Section 9.2.11) and provides answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

9.2.9.1 Interpretation

Clinical handover is a complex process with significant variability in its understanding (KF4 see Section 9.2.4), its practice (KF1 see Section 9.2.1) and the functions that it serves (KF8 see Section 9.2.8). In order to understand clinical handover improvement and the role of IT in clinical handover improvement, a user-centred approach must be adopted to understand the process prior to determining the user requirements for the development of an electronic tool. The user requirements for clinicians of different seniorities are different and the user requirements obtained needs to be analysed in conjunction with the data collected via semi-structured interviews, observations and compilation of clinical handover notes to ascertain how the electronic tool might help assist in clinical handover. Interns mainly handover descriptive, task based responsibilities and as such, an electronic tool is an ideal medium to assist in the clinical handover improvement process of interns providing proper documentation and access to clinical handover notes. Registrars and consultants on the other hand conduct mainly at a cognitive level providing diagnostic reasoning for patient care. As such, while the basic requirements for documentation and access is the same, the other requirements of the tool might be quite different and an electronic tool might not help in a registrar handover.

It is important to engage all users in the clinical handover improvement process. While analysis of the data indicated that interns would be the primary users of the electronic tool, the research must emphasise that all clinicians who are involved in clinical handover be involved in the process so that the electronic tool is not developed in isolation. An over-arching user-centred approach is essential in involving clinicians of all levels to obtain an in-depth understanding of clinical handover from different perspectives in order to ensure that the improvement strategies developed are practical and cater to the needs of the end-users. As a result, it is important to not only identify the primary end users but also engage clinicians who might not be the primary end users of the final product but have a significant influence to the utilisation of the final product. As such, it is important to emphasise that the methodology used in this research is essential in order to engage all clinicians from interns to consultants.

It therefore appears that while basic user requirements is an important consideration in the development of the electronic tool, a more important consideration would have to be whether the electronic tool will be useful to clinicians at different levels despite similar user requirements. The decision to develop an electronic tool to cater to its primary end users can only be obtained through detailed analysis and interpretation of the status of clinical handover in the hospital by adopting a user-centred approach. Therefore, the role of the researcher is highly important not only in obtaining user requirements for the development of the electronic tool but also in understanding the status of clinical handover and developing insights into whether an electronic tool can assist and how it can assist in clinical handover. This is especially important given the finding from the core category *CLINICAL HANDOVER EXPERIENCES* that clinicians might not have a clear view of what the actual clinical handover process is.

9.2.9.2 Discussion

This research has demonstrated the central role of a user-centred approach in understanding clinical handover and clinical handover improvement. It has found that involving users at all levels is essential in the clinical handover improvement process. This research has described the process of understanding user requirements in context and engaging with the users to develop and electronic tool. This key finding is further discussed in relation to the available literature.

Engaging users in the design and development of electronic tools have been extensively described in the literature. The literature suggests that involving end users in the design and implementation of electronic tools will ensure better acceptance and utilisation of the tool (Weber-Jahnke and Price, 2007). Various techniques have been reported in the literature on how to involve the users in the design phase. A complex method of user engagement to assist in the understanding of workflow prior to the design of IT tools is presented through a series of articles about a collaborative clinical trial protocol system (Weng *et al.*, 2007, Gennari *et al.*, 2005, Gennari *et al.*, 2004, Weng *et al.*, 2004, Weng *et al.*, 2003). The group uses multiple different methods, including prototype scenarios (Weng *et al.*, 2003), ethnographic studies (Gennari *et al.*, 2004), participatory design and iterative prototyping (Gennari *et al.*, 2005), a combination of the above with semi-structured interviews and work artefact analysis (Weng *et al.*, 2007) and finally IT design and implementation (Weng *et al.*, 2004). Human factor engineering has also been proposed by some researchers to be a very useful tool for designing IT applications (Beuscart-Zephir *et al.*, 2010). Participatory design is widely used in the European countries and the MUST method has been used in healthcare IT design with some success (Kensing *et al.*, 2007).

There appears to be a disjuncture between the information systems literature in regard to the design of IT tools and the clinical handover literature. Available literature on clinical handover have failed to document how end users were involved in the design and implementation of an electronic clinical handover system (Ryan *et al.*, 2011, Raptis *et al.*, 2009, Morrison, 2006, Cheah *et al.*, 2005, Morris and Baker, 2005, Solet *et al.*, 2005, Van Eaton *et al.*, 2005, Van Eaton *et al.*, 2004, Petersen *et al.*, 1998). There was no discussion in the literature about dealing with varying levels of IT knowledge and expectations and the conflict between senior and junior clinicians in these articles that describe electronic clinical handover systems. No discussion was also provided regarding the solutions to these challenges and conflicts. It is uncertain as to whether end users had been engaged in the design of many of these electronic clinical handover systems. It is unclear in the literature how system designers decide which functions or features to incorporate in their electronic clinical handover systems. This thesis therefore contributes significantly to the field of information systems by demonstrating a method to obtain the understanding of clinicians in regard to clinical handover as well as design and develop an electronic tool to support clinical handover.

This research argued that users must be engaged in clinical handover improvement initiatives in one or all of the following ways using various methods:

- Understanding the process of clinical handover and identifying problem areas with the current process, using interviews, observations and focus groups

- Suggesting solutions to the problems identified above, using interviews, observations, focus groups and design workshops
- Assisting in the development of the proposed solutions, using focus group and design workshops and analysis of clinical handover notes
- Providing feedback on the solutions implemented, through an iterative process, interviews and observations

The user-centred approach used in this research has informed further work on clinical handover conducted by the Australian Commission on Safety and Quality in Health Care in conjunction with the researcher and other colleagues. The OSSIE Guide to clinical handover improvement emphasised the need to engage with users through the various different stages in clinical handover improvement (Australian Commission on Safety and Quality in Health Care, 2010). The OSSIE guide recommended engaging users in developing a local understanding of clinical handover, a user-centred solution and implementation plan, implementation of the solution and finally evaluation and feedback on improving the clinical handover process (Australian Commission on Safety and Quality in Health Care, 2010). The OSSIE Guide also placed emphasis on education and training for staff and the development of a good handover culture (Australian Commission on Safety and Quality in Health Care, 2010). These recommendations made in the OSSIE guide were based on preliminary findings in this research and validated through the utilisation of this methodological approach across multiple sites.

This thesis has therefore made significant contribution to the field of quality and safety, clinical handover as well as IT/IS, by introducing and modifying techniques commonly used in IT/IS into clinical handover improvement. This has since informed national clinical handover initiatives and adopted into national guidelines.

9.2.10 While a user-centred approach is extremely useful, there are many challenges associated with this approach in clinical handover improvement and quality and safety initiatives (KF10)

This key finding emerged from both core categories of USER REQUIREMENTS (see Section 8.6) and IT/IS CONSIDERATIONS (see Section 8.7). This key finding relates to KF9 (see Section 9.2.9) and KF11 (see Section 9.2.11) and provided answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

9.2.10.1 Interpretation

While this research has highlighted the many benefits of using a user-centred approach and suggest that a user-centred approach be a central strategy in understanding clinical handover improvement (KF9 see Section 9.2.9), there are many challenges associated with this approach especially from the perspective of information systems research.

The first challenge encountered from the researcher's perspective is in understanding the clinical context and information collected. Clinical handover notes were analysed by the clinical handover project registrar and this was then communicated and explained to the researcher. While it is possible for someone without any medical background to be involved in clinical handover research, it required significant involvement from an informant and the cohort of clinicians.

The second challenge faced is how to identify the end-users from which to obtain the user requirement. While it was obvious in Phases One and Two that interns were keen to trial an electronic tool, user requirements had to be obtained from users at all levels to ensure that all clinicians were engaged in the clinical handover improvement process. As a result, the researcher had to accommodate the various requests from consultants (many of whom were unlikely to use the electronic tool) where possible but at the same time focus mainly on the requirements of the interns as they were identified as the ultimate end-users. This research found that manoeuvring within the highly hierarchical environment of medical practice is very important to ensure users are engaged at all levels. In a hierarchical environment, the use of a user-centred approach needs to consider two groups of users – the end-users themselves and the users who have a strong influence on others who use the electronic tool. Attempting to balance requirements from both groups means engaging users at all levels and going through multiple iterations.

Within the Department of General Internal Medicine, consultants are the ones who make the final decision about a patient's treatment. This translates to the fact that it is the consultants who have a more powerful role in the overall management of the department as well as have a say in budgetary and resource allocations. The more junior clinicians, especially the interns are usually not involved in the management side of things and generally do not have much say about what goes on in the Department.

The user-centred approach adopted in this research has somewhat challenged the hierarchical nature in the Department. Many consultants are not involved in handover sessions apart from morning handover and many of them do not appear to have a clear understanding of clinical handover in the department and do not know what the best practice is to support clinical handover. Most clinical handovers are conducted by interns and registrars in the department. Therefore, the end-users of the electronic tool are really the interns and registrars. While the consultants have voiced their support for the introduction of the electronic tool, they have primarily left the design of the electronic tool to the interns once it was pointed out to them that the interns were going to be the routine users of the electronic tool. However, consultants did request for some changes to be incorporated into the electronic tool when they viewed the final prototype.

This creates a dilemma in the user engagement process and in identifying co-participants. The researcher took into account both the views of senior and junior clinicians and compromises had to be made. Although the interns were identified as the primary end-users of the electronic tool, the views of consultants also had to be taken into account as they were the ones who provided the resources for the development of the electronic tool. This can sometimes create tension amongst the different groups of clinicians. This research therefore suggests that it is important to conduct observation sessions to ensure that end users are identified and other data collection methods like semi-structured interviews and focus groups to ensure their views are conducted. Focus groups if utilised needs to separate clinicians of different seniorities to ensure that their views are adequately captured.

Finally, this research found that clinicians find it difficult to articulate exactly what it is they want out of the electronic tool to support their clinical handover practice. An example to illustrate this

is the process of prioritisation. In Phases One and Two, participants indicated their wish to have a system in place which can assist in them prioritising their patients. However, this functionality was not used when incorporated into the electronic tool. The reasons as to why participants did not utilise this functionality has been discussed in Section 8.6.4. Participants in providing their user requirements appear to work towards an ideal way of how they want to do their work rather than reflect on how its currently being done.

This research has found that clinicians have difficulties in conceptualising and articulating what they want out of the electronic tool without actually seeing the physical product and trialling it in clinical practice. When clinicians were asked during interviews and focus groups to describe a system which they perceive will help them provide a better handover, they found it difficult to provide a description of what they need. As a result, a combination of observation sessions, informal discussions, interviews and analysis of clinical handover notes were used as the foundation to provide some basic system requirements for debate and discussions. This facilitated better participation and discussions amongst clinicians in the design workshops.

Clinicians identified many issues in the initial prototypes and multiple revisions were made to address those issues. The final version was produced when all participants were in agreement that it had reflected all the changes that they wanted made. Despite this, they identified further changes that were required after the introduction of the electronic tool. Workflow issues only started to appear after the introduction of the electronic tool. It is important to note that although clinicians indicated that they were satisfied with the final prototype, new issues emerged when the prototype was introduced in clinical practice (see Section 6.8.3) and the system developers must be able to make amendments rapidly.

Clinicians always want the best systems to support their clinical practice. When clinicians try to work out their user requirements, they tend to work towards an ideal way of doing their work rather than how they think they work will be done. This is not different to the findings of perceived and actual handover presented in Section 9.2.7. When the electronic tool was built, clinicians found that the ideal practice was different to their current workflow. This lack of understanding of their own workflow proves very difficult for the introduction of technology to assist in the process. The user-centred approach used in this research of using a range of data collection methods only reduced the likelihood of the problem rather than obliterate the problem altogether. Introduction of an electronic tool therefore requires close monitoring and changes required needs to be rapidly done.

9.2.10.2 Discussion

This key finding identified significant challenges in using a user-centred approach in clinical handover improvement initiatives. In this research, the clinical handover improvement initiative was the development of an electronic tool but it is the researcher's belief that these challenges will be faced in the development of any quality and safety intervention.

The researcher faced significant difficulties and challenges associated with using a user-centred approach to engage users in order to obtain user requirements for the development of the electronic tool. There was no mention of challenges in electronic tool development in clinical handover apart from (Wong *et al.*, 2007). There was no mention at all in the literature about how

users were engaged in the process of developing the electronic tool and as such, the discussion below attempts to broaden the discussion to a more general view of the development of electronic tools in general and not constrain it to the context of clinical handover.

The difficulties with engaging clinicians have been well described in the literature (Thielst and Gardner, 2008, Gruchmann and Borgent, 2007, Wong *et al.*, 2007, Chaudhry *et al.*, 2006, Wears and Berg, 2005). The difficulties and challenges in using user-centred approach in designing electronic tools to support clinical handover might be somewhat unique and these have not been described in the literature before. This research not only provided a discussion with regards to users within a clinical handover context, but also demonstrated how these issues might be mitigated through the adoption of multiple data collection methods. The utilisation of multiple methods of data collection to engage users have been described by (Abrams *et al.*, 2005) in user-centred design and this research provides further discussions about this in the context of a user-centred approach.

The finding of this research has revealed that clinicians find it hard to articulate user requirements and what they do in their clinical routine day-to-day. This has been described in the literature both in regard to information systems (Denzin and Lincoln, 2005) and information technology design in healthcare (Wong *et al.*, 2007, Wears and Berg, 2005). It was also found that users often wanted perfection and had unrealistic expectations of what the electronic system is able to achieve. Users find it hard to articulate what they want and often request features which cannot be achieved due to practical constraints (Baek *et al.*, 2008). This research further highlights the fact that the impact of an electronic tool on clinical practice is not easily understood. Some impact of the electronic tool would only be known after implementation. This is consistent with literature in regard to other interventions, especially IT interventions (Cheryl L. Damberg *et al.*, 2009, Ammenwerth *et al.*, 2006, Kellogg *et al.*, 2006, Wears and Berg, 2005). This research also suggests that an iterative feedback process is required through constant discussions and negotiations with the participants. This process is continuous even after the final prototype had been agreed on by clinicians. This is a significant challenge for IT implementation given the often limited resources and budget. There were few studies in this area within the healthcare setting and this thesis suggests that future studies in this area will be beneficial.

This research has also found that the hierarchical nature of clinical practice had a significant impact on the user-centred approach used and the ability to identify and engage with end-users in the development of the electronic tool. The literature on hierarchical structures within the medical field and power-relationships between consultants and junior clinicians was not widely available. A recent article has mentioned this point in discussing the potential disadvantages of participatory design method (Lyng and Pedersen, 2011). This is an interesting area which requires further research and exploration.

9.2.11 It is imperative to mandate the use of the electronic tool for all clinical handover sessions (KF11)

This key finding emerged from the core category of IT/IS CONSIDERATIONS (see Section 8.7) and the core category of ENVIRONMENTAL CONSIDERATIONS (see Section 8.4). This key finding

relates to KF9 (see Section 9.2.9), KF10 (see Section 9.2.10) and provides answers to RQ2 (see Section 9.3.2) and RQ3 (see Section 9.3.3).

9.2.11.1 Interpretation

This research has found that various factors dictate the use of the electronic tool in clinical handover. Firstly, the research found that use of the electronic tool has increased the workload of the interns. However, it was interesting that some interns were willing to spend some time after their shift entering the information into the electronic tool to support good clinical handover. Secondly, the availability of desktop terminals and printers and the level of support provided by the hospital had become a very important issue after the introduction of the electronic tool. The electronic tool also had to be maintained regularly. Thirdly, this research found that while education and training in using the electronic tool was important, a clinician's pre-existing IT knowledge, skills and experience is the most important determinant of the utilisation of the electronic tool. Clinicians who were familiar with IT in general were more inclined to use the tool whereas clinicians who were more comfortable with paper-based systems tended not to use the tool. Finally, data analysed in Phase Three found that the information in the electronic tool became extremely unreliable when some clinicians chose to use the tool and some clinicians chose to use pen and paper and this impacted on the care of the patient. The clinical handover process requires information to be documented continuously and therefore what is documented in the electronic tool needs to be consistently updated to reflect on the current status of the patient.

This research has also found that the electronic tool needs to be utilised by all clinicians for it to be useful in supporting clinical handover. This is especially important as one party heavily relies on the information provided by the previous party in clinical handover. There needs to be only one source of clinical handover information which is kept updated. If one clinician decides not to use the electronic tool for one shift, the information contained in the electronic tool will not be accurate and will not be able to adequately support clinical practice. It might in fact even compromise patient care.

There needs to be an element of trust in the utilisation of the electronic tool. Firstly, clinicians need to be able to trust that their colleagues are entering the information into the electronic tool. Secondly, clinicians also need to be able to trust the information that is entered into the electronic tool and thirdly, clinicians need to be able to trust that there is adequate support for the use of the electronic tool.

This element of trust explains a clinician's behaviour when faced with factors which impact on the use of the electronic tool. Many clinicians were willing to spend extra time after their shift entering the information into the electronic tool when faced with a heavy workload. This can be explained by the fact that clinicians value the trust element. They want their colleagues to trust them and so were willing to put in the extra work. Clinicians appeared to have trust issues with other clinicians who could not be bothered to put in that extra work and this was not only applicable to clinical handover.

Clinicians need to be able to trust the information that they obtain from the electronic tool. This means that the information should be reliable. In order for the information to be reliable, not

only do the clinicians have to accurately enter the information, there also needs to be adequate and regular maintenance and support in place for the use of the electronic tool.

The element of trust is very important in the use of the electronic tool. They are more likely to use the electronic tool if they trust that the information it provides is accurate and reliable. However, the accuracy and reliability of the information provided by the electronic tool is affected in the event that one intern decides not to use the electronic tool in a particular shift. This then leads to the intern from the next shift not being able to trust the information provided in the electronic tool and will be reluctant to use the electronic tool in the future.

In order to ensure that the information contained in the electronic tool is accurate and reliable, there needs to be a mandate that all users must use the electronic tool solely as the medium for documenting clinical handover information.

9.2.11.2 Discussion

This key finding indicated that various factors dictate the utilisation of the electronic tool but it was imperative to mandate the use of the electronic tool in all handover sessions despite the fact that it was only designed to be a support tool. This finding is further discussed below in relation to the available literature.

Analysis of the data in Phase Three revealed that the introduction of the electronic tool significantly increased the workload of the interns, especially shortly after implementation. This is consistent with the findings by Cheah *et al* (2005). The increased workload of the outgoing team had a significant influence on the face-to-face meeting during clinical handover despite the fact that there appeared to be a very good implementation plan in place (Cheah *et al.*, 2005) but appeared to level off once the users became familiar with the system. More importantly, this research found that most clinicians will continue to use the tool despite of the increase in workload. This is again consistent with the findings by Cheah *et al* (2005).

The second issue relates to the availability of hardware and maintenance of the electronic tool. This issue had not yet been addressed in the literature in the context of clinical handover (Ryan *et al.*, 2011, Raptis *et al.*, 2009, Cheah *et al.*, 2005). While there has been some mention about the availability of hardware and software, there has been no discussion as to how this impacts on other factors in clinical handover (Cheah *et al.*, 2005, Petersen *et al.*, 1998). This research therefore raises the issue that adequate maintenance of the IT infrastructure and support is a critical factor in ensuring the success of the electronic tool.

Thirdly, this research has found that general IT literacy, rather than being competent in the use of the electronic tool is important in determining a smooth transition to using IT to support clinical handover. The literature indicated that there might be heterogeneity in regard to IT knowledge and skills and understanding the IT literacy level might be important (Thielst and Gardner, 2008). A recent study in adapting and utilising electronic clinical handover systems has highlighted that one of the critical success factors for electronic clinical handover systems implementation is the fact that the users are all junior doctors who are IT savvy (Raptis *et al.*, 2009). This research has further validated the finding of this thesis. There were, however, no suggested strategies in the

literature on how to deal with the issues of heterogeneity in IT literacy. This research therefore lays the foundation for further work in this area.

Finally, the issue with IT literacy poses a challenge in adopting a user-centred approach as a dilemma arises between an individual's right to want to use a tool that he or she is comfortable with and the need to consider the clinical handover system as a whole. Within the clinical handover setting, this research suggests that while user-centredness is extremely important in the development of an electronic tool, a decision needs to be made to mandate the use of one single tool for clinical handover. Clinicians can be upskilled in the use of technology but the hospital needs to provide the required support and consider revising the tools when necessary to cater to the clinician's needs.

The finding that only one tool should be used in clinical handover setting within a department has yet to be reported in the literature. All electronic clinical handover tools that have been developed attempt to replace the current system and not support it. While involving clinicians in the design of the tool has its advantages, it is important to note that these advantages will not be realised if not all clinicians use the tool. It is also important that while generating user insights to assist in the design and understanding of the clinical handover process is essential, when it comes to implementation of the clinical handover tool, an individual clinician's wish might need to be compromised to ensure that all clinicians use the tool. Therefore, user-centred approach has its limitations in the implementation and utilisation of an electronic tool.

Finally, in regard to the issue of trust within the healthcare system, while this is the researcher's interpretation of the data, it is interesting to see that a recent research has mentioned trust as a major factor in clinical handover (Cleland *et al.*, 2009). While the trust indicated is whether the information transferred from one person to the other is utilised is based on trust, this research suggests that the relationship can be expanded to include electronic tools and clinicians and as such provides significant insights into future clinical handover improvement efforts and outcomes of clinical handover research.

9.3 Answering the research questions

From this research, eleven key findings were identified which have been identified and discussed above with reference to available literature. These key findings have provided significant insights into using a user-centred approach to explore shift-to-shift clinical handover and clinical handover improvement in the Department of General Internal Medicine, Royal Hobart Hospital. These key findings identified above will now be used to address the research questions and associated research objectives.

9.3.1 Status of shift-to-shift clinical handover and clinical handover improvement

The first research question and associated research objectives are listed as follows:

RQ1: What is the status of shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine?

RQ1-O1: To explore the participant's understanding, expectations and experiences of clinical handover.

RQ1-O2: To identify previous clinical handover improvement initiatives undertaken.

RQ1-O3: To identify the factors that impact on clinical handover

Analysis of the data has revealed that the status of clinical handover in the Department of General Internal Medicine is complex and evolving. Three perspectives need to be taken in exploring the status of shift-to-shift clinical handover. These three perspectives include a contextual perspective, a clinical perspective and a user perspective (see Section 9.2.1). These three perspectives are important as it impacts on the level of success of clinical handover improvement initiatives. It also reveals that clinical handover improvement initiatives might need to cater for a certain aspect of clinical handover (e.g. information transfer) or a certain group of clinicians who participate in clinical handover (e.g. interns). This is related to answering RQ2.

In addressing RQ1-RO1, this research has found that a clinicians' understanding, expectations and experiences of clinical handover varies not only at a particular point in time but also over time (KF5). While their understanding and expectations vary, there is an underlying commonality in the provision of clinical care and that commonality is the need to ensure the continuity of patient care (KF5, KF8).

In addressing RQ1-RO2, this research has identified previous clinical handover improvement initiatives within the department and has found that it is the readiness for change which is important. This readiness for change is guided by current national and international initiatives as well as previous attempts already made to improve clinical handover by the department (KF1).

In addressing RQ1-RO3, this research has found that multiple factors affect clinical handover. These factors can be divided into human factors, environmental factors and organisational factors (KF7). Cultural background plays an important role within human factors (KF6). From analysing the data from each phase, it appears that the interrelationships between human, environmental and organisational factors determine the efficiency and effectiveness of clinical handover but data analysed over the three phases indicated that clinicians identified and addressed individual factors which can be modified collectively but will not highlight and address these factors if it causes a divide between them.

In summary, the complexity of the status of clinical handover, the differing understanding of clinical handover and the various factors affecting clinical handover.

9.3.2 Clinical handover improvement insights

The second research questions and associated research objectives are listed as follows:

RQ2: What clinical handover improvement insights are generated from using a user-centred approach?

RQ2-O1: To identify insights from the participants that can be utilised in clinical handover improvement.

RQ2-O2: To incorporate the insights generated into the design of an electronic tool for clinical handover.

The use of a user-centred approach generated significant insights for clinical handover improvement in general and the development of an electronic tool to support clinical handover. The use of a user-centred approach throughout this research also generated significant insights and concluded that this approach was extremely useful in this research (KF9) but also had numerous limitations (KF10).

A number of clinical handover improvement insights have been identified in addressing RQ2-RO1.

- It is imperative to first understand the practice of clinical handover in context and the users in any clinical handover improvement as clinical handover is a complex and variable practice and was influenced by human, environmental and organisational factors.
- While creating a culture is important for clinical handover improvement, it is more important to create an incremental change which fits into the routine workflow of clinicians (KF3).
- There are differences between perceived and actual clinical handover. This is especially evident in a consultants' perception of clinical handover and clinical handover improvement initiatives must address the actual clinical handover process without disengaging clinicians in the process.
- Education and training is important for clinical handover improvement but there needs to be standards established in the practice of clinical handover first and the education and training program needs to be delivered via formal channels either through the undergraduate or post-graduate medical training programs (KF2).
- Clinical handover serves various functions which both directly and indirectly impact on patient care. Any clinical handover improvement initiative undertaken must take into account these functions and identify the ones which either directly or indirectly positively impact on patient care and attempt to maintain these functions in the clinical handover improvement initiative (KF8).

In addressing RQ2-RO2, the insights generated which are specific to the design of the electronic tool are as follows:

- End-users need to be identified for whom the electronic tool is designed for. Clinical handover is complex and involve clinicians at different levels with different user requirements who practice clinical handover differently. Therefore, it is imperative to obtain an in-depth understanding of the practice and identify the end-users prior to obtaining user requirements.
- The electronic tool developed must not deviate too much from the current established practice of clinical handover. The electronic tool should only be used to refine and improve clinical handover practice and not make big changes to current practice as that will not be adopted by the users.

- Due to differences in perceived and actual handover, clinicians must be heavily involved in trailing the electronic tool and providing feedback and this needs to be done over numerous cycles to ensure that the electronic tool fits in with routine clinical practice (KF9).
- Education and training needs to be provided to support the clinicians in the use of the electronic tool.
- Clinical handover serves different functions which directly and indirectly impact on patient care and consideration needs to be given as to how these functions will be affected by the introduction of the electronic tool.
- After the introduction of the electronic tool, insights were obtained in regard to the development and utilisation of the electronic tool. A clinician's IT literacy and experience is an important consideration in determining the usefulness of the electronic tool, the availability of adequate IT infrastructure and support and it is imperative to mandate the use of the electronic tool to ensure the accuracy and reliability of the information provided in the electronic tool (KF11).

9.3.3 Outcomes achieved from a user-centred approach

The third research questions and associated research objectives are listed as follows:

RQ3: What outcomes are achieved from the use of a user-centred approach in clinical handover improvement?

RQ3-O1: To explore the benefits of a user-centred approach on clinical handover improvement.

RQ3-O2: To explore the challenges in using a user-centred approach on clinical handover improvement.

In addressing RQ3-O1, the benefits of a user-centred approach on clinical handover improvement include:

- Developing commonalities in the understanding of clinical handover from information transfer to continuity of patient care which has significantly influenced the practice of clinical handover.
- Negative factors influencing clinical handover in Phase One had been changed to positively influencing clinical handover in Phase Three.
- Contribution to the emergence of a handover culture at the end of three phases
- Identifying users at different levels and what their respective roles are in clinical handover and clinical handover improvement.
- Development of an electronic tool that fits into their workflow.

In addressing RQ3-O2, the challenges of a user-centred approach on clinical handover improvement have largely been addressed in KF10 and these include:

- The researcher's understanding of the clinical context and information collected.

- How to effectively identify end-users from whom to obtain the user requirements.
- Effectively manoeuvring within a hierarchical environment.
- Considering and balancing user-requirements from different groups of users to keep them engaged.
- Developing an electronic tool in an environment whereby clinicians find it difficult to articulate what it is they require from the electronic tool to support their practice of clinical handover.
- Catering to the need for quick revisions to the electronic tool if requested.

9.4 Chapter reflections

This chapter has presented an interpretation and discussion of eleven key findings which emerged from integrating the findings obtained in the previous chapter. This chapter has also addressed the research questions and associated research objectives.

This research has found that clinical handover is a complex process and requires understanding from three perspectives (KF1). Different clinicians have a different understanding of clinical handover (KF4) but the underlying commonality at the end of this research is the need transfer information for continuity of patient care (KF8). Clinical handover also serves various other functions apart from the transfer of information (KF8). Valuable insights have been obtained in understanding clinical handover improvement. Various factors affect clinical handover but workload (KF6), individual personalities and cultural background are most important (KF5). The interrelationship of factors appear significant in each phase but when data is collected over multiple phases, the nature of the factors as to whether they can be controlled by a collegial group of clinicians emerges as being most important (KF6). This research has found that a formal education and training program with standards in place is important for clinical handover improvement (KF2). This research also emphasises the need to use a user-centred approach in clinical handover improvement as that might lead to the development of a handover culture (KF3). While the use of a user-centred approach is beneficial, it is associated with numerous challenges (KF10). More importantly, if a decision has been made to introduce the use of an electronic tool, it is imperative to mandate the use of that electronic tool in order to ensure that the information is reliable which contributes to patient safety (KF11).

This research has also illustrated the value of utilising qualitative research techniques to collect data through semi-structured interviews and compilation of clinical handover notes and then analyse these data collected drawing on the principles of grounded theory to obtain user insights and user requirements for clinical handover improvement which in this case was the development of an electronic tool. Involving the users in the development of the electronic tool helped further refine and enhance their understanding of clinical handover and clinical handover improvement. The use of a multi-snapshot approach over three phases in combination analysis of the data drawing on the principles of grounded theory provides opportunities for future research in both clinical handover and the quality and safety domain.

Chapter 10 Findings and conclusion

10.1 Introduction

This final chapter provides a synthesis of the key findings presented in this thesis followed by a discussion about the contributions to knowledge this research has made. This chapter then highlights the limitations of the research followed by suggesting future research in this area.

- Section 10.2 provides a synthesis of the findings from this research. The synthesis of findings links together all eleven key findings to provide an understanding of clinical handover and clinical handover improvement and the outcomes of using a user-centred approach in exploring clinical handover improvement.
- Section 10.3 summarises the research contributions made at a substantive, methodological and theoretical level. At a substantive level, it has provided guidance to researchers wanting to conduct research in clinical handover and clinical handover improvement. At a methodological level, it has highlighted the importance of adopting a user-centred approach over multiple phases when conducting research into clinical practices that are not clearly defined. At a theoretical level, it has developed a conceptual understanding of clinical handover from a contextual, clinical and user perspective.
- Section 10.4 highlights and discusses the limitations of this research which includes the scope of research, lack of generalisability and research bias.
- Section 10.5 suggests areas for future research. This research has opened up new possibilities of research into clinical handover and clinical handover improvement.
- Section 10.6 provides a summary reflection of the chapter.

10.2 Synthesis of findings

This research was initiated to obtain an in-depth understanding of clinical handover and clinical handover improvement and to obtain insights for clinical handover using a user-centred approach which is addressed through RQ1 and RQ2. The researcher was also interested in exploring the outcomes associated with the use of a user-centred approach in understanding clinical handover and clinical handover improvement which is addressed through RQ3.

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|------|--|
| RQ1: | What is the status of shift-to-shift clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine? |
| RQ2: | What clinical handover insights are generated from using a user-centred approach? |
| RQ3: | What outcomes are achieved from the use of a user-centred approach in clinical handover improvement? |

10.2.1 Status of shift to shift clinical handover

This research has found that clinical handover is a complex and dynamic process and the status of shift-to-shift clinical handover can only be addressed by taking into account three perspectives which interact together to provide a snapshot of the status of clinical handover at any one time. This is described in detail in KF1 (see Section 9.2.1).

This research has also found that clinical handover is a complex and evolving concept in clinical practice. The complexity is due to the need to consider clinical handover within clinical practice operating within a complex healthcare setting which involves a team of healthcare professionals working together to deliver patient care. As a result, clinical handover needs to be understood through different perspectives. From a user perspective, this research has found that clinicians at different seniority levels understand clinical handover differently. The interns who are the most junior members of the team understand clinical handover as being task-based. More senior clinicians e.g. registrars and consultants have more complex and abstract views about a diagnosis of a patient. The second layer of complexity relates to clinical handover and its role in clinical practice. From a clinical perspective, the handover of patient care can be temporary or permanent. Also, the timing of clinical handover within a clinician's shift also contributes significantly to the overall conduct during handover. From a contextual perspective, clinical handover is an evolving clinical practice due to national and international clinical handover improvement initiatives.

As a result, this research proposes that the status of clinical handover be considered from a contextual, clinical and user perspective. This contributes significantly to theory in the field of information systems and clinical practice which allows for a more in-depth understanding of clinical handover and clinical handover improvement.

More importantly, this research has identified that the complexities of clinical handover are due to the differences in the clinicians' conceptual understanding of clinical handover as a clinical practice which has been described in KF4 (see Section 9.2.4). Clinical handover was also found to serve various functions and these functions evolved with the changing understanding of the practice of clinical handover and the introduction of the electronic tool to support clinical handover practice. This has been described in KF8 (see Section 9.2.8).

10.2.2 Insights for clinical handover improvement

This research has obtained significant insights for clinical handover improvement based on the three perspectives highlighted in KF1 (see Section 9.2.1). These insights are described below:

- Workload has a significant influence on clinical handover improvement regardless of what tools are currently being used in clinical handover. This has been discussed in detail in KF5 (see Section 9.2.5). If the workload is heavy, clinicians are less likely to use the designated tools in clinical handover. However, if the workload is light, clinicians have a tendency to prepare for handover and in the process conduct a better handover. Therefore, clinical handover tools must allow for clinicians to provide clinical handover information throughout their shift so that their workload is better managed and divided throughout their shift.

- Individual personalities and cultural background strongly influence clinical handover but are hard to address and manage in a clinical setting. These two factors are highly significant as discussed in KF6 (see Section 9.2.6) but are not easy to address as it might cause a divide amongst clinicians.
- Education and training in clinical handover is important but requires standards in place and a formal curriculum for it to have a recognised impact on clinical handover improvement. This insight has been discussed in detail in KF2 (see Section 9.2.2).
- Clinical handover culture is important but it requires engaging with clinicians over a period of time to develop. This has been discussed in detail in KF3 (see Section 9.2.3). This research has found that the development of clinical handover culture is important for clinical handover improvement but needs to be done incrementally over a period of time.
- Various tools (including electronic tools) can be used as part of clinical handover improvement but it is imperative to mandate the use of one tool to ensure that there is continuity of information provided for continuity of patient care. This has been discussed in KF11 (see Section 9.2.11).

While this research has generated significant insights into clinical handover improvement within the Department of General Internal Medicine at the Royal Hobart Hospital, it is important to emphasise that clinical handover is a complex clinical practice and therefore these insights need to be considered from a contextual, clinical and user's perspective. As a result, the answers provided in RQ1 forms a background to understanding and answering RQ2. Therefore, the important question for other departments and other hospitals to consider is not what insights can be obtained but how these insights can be obtained for clinical handover improvement.

This research has argued that these in-depth insights can only be obtained through a multi-snapshot approach combining various data collection techniques and conducting an in-depth analysis of the data to understand the practice of clinical handover and at the same time engage users in the clinical handover improvement process. This makes a significant contribution at the methodological level.

10.2.3 Outcomes of a user-centred approach

This research has used a user-centred approach to understand clinical handover and obtain insights for clinical handover improvement and to explore the outcomes from the use of a user-centred approach at the end of the research process.

The first important outcome is the development of a culture of clinical handover. This research has found that it is possible to develop a culture of clinical handover by engaging clinicians in a process of self-reflection to develop insights into clinical handover improvement and also in the development of an electronic tool. This has been discussed in KF3 (see Section 9.2.3).

Secondly, the electronic tool which had been developed as part of the process of engaging clinicians through the use of a user-centred approach might have helped with improving a clinician's understanding of clinical handover as well as the practice of clinical handover. More

importantly, the user requirements which had been obtained through this process can continue to be refined over time. This is further discussed in KF9 (see Section 9.2.9).

This research has also found that there are significant challenges of using a user-centred approach with a clinical setting. These challenges are discussed in detail in KF10 (see Section 9.2.10). It is important to note the importance of the involvement of an external researcher or facilitator in using a user-centred approach as that contributed to the finding that there were differences between perceived and actual clinical handover practices which have significant impact on clinical handover improvement. This has been described in KF7 (see Section 9.2.7). The involvement of a researcher who does not have background in medical practice poses some significant challenges.

The involvement of non-clinicians, in clinical handover research, however, creates significant challenges. More importantly, clinicians often do not know what they want to improve clinical handover and as such, the outcomes of clinical handover improvement strategies might be difficult to define. Clinicians were found not to be able to clearly articulate their requirements to improve clinical handover and as a result, it might difficult to define the outcomes of clinical handover improvement strategies.

This research has made significant contributions at the substantive level on how researchers with no clinical background can conduct clinical handover research and how to guide clinicians through the use of a user-centred approach in understanding their practice of clinical handover and generate insights for clinical handover improvement.

10.3 Research contributions

This research makes a significant contribution to the information systems discipline and to clinical handover at a substantive, methodological and theoretical level. This is further discussed below.

10.3.1 Substantive level

At a substantive level, this research has contributed significantly in three areas: Clinical handover improvement in general, the use of electronic tools in clinical handover improvement and IS research conducted in a clinical setting.

Firstly, this research has illustrated the use of an over-arching user-centred approach for data collection drawing on the principles of grounded theory for data analysis to understand clinical handover, clinical handover insights and apply the insights obtained into a clinical handover improvement strategy. This approach has engaged users as the primary drivers in the process and has laid the foundations for further work conducted across different clinical settings in the development of a “how to” guide for clinicians and managers for clinical handover improvement known as the OSSIE Guide. The OSSIE guide has been endorsed as national guidelines in Australia for clinical handover improvement. This has contributed significantly at a substantive level in clinical handover improvement.

This research has also argued that various considerations must be taken in order to increase the likelihood of success in the use of an electronic clinical handover tool. This includes the understanding of clinical handover and an existing culture of good handover. The electronic tool

might refine and improve the culture of clinical handover incrementally but cannot be used solely in an attempt to develop a culture in clinical handover. This research which has focused on the use of an electronic tool in a clinical setting has informed further work in the area involving different healthcare organisations in different states in Australia. This has since been developed into a guideline for the safe use of electronic tools. This research has informed part of those guidelines and has contributed significantly at a substantive level to the development and implementation of electronic tools for clinical handover improvement.

This research has identified various challenges in involving IS researchers in exploring a clinical process and facilitating the development of an electronic tool in a complex and dynamic clinical practice. This has been highlighted and discussed in detail in KF10 (see Section 9.2.10) and contributes to the knowledge of other IS researchers wanting to conduct a similar type of research.

10.3.2 Methodological level

At a methodological level, this research has contributed significantly in two ways. Firstly it has illustrated the importance of the use of an over-arching user-centred approach within a multi-snapshot case study to understand the practice of clinical handover from the users' perspectives. Secondly, it has contributed to the use of methods drawing on the principles of grounded theory to generate an understanding of the process of clinical handover and assist in the development of an electronic tool drawing on the principles of participatory design in an attempt to improve the process of clinical handover. Further data was collected to provide further insights the outcomes of using an over-arching user-centred approach over three phases.

The use of a multi-snapshot case study approach is useful for complex clinical processes like clinical handover that are dynamic and evolving. The user-centred approach used within this multi-snapshot case study allowed for a longitudinal understanding of the clinical handover process from the users' perspectives and allowed for the emergence of relationships within each phase and between each phase. The key findings of this research only emerged after analysis of the relationships between three phases which allowed for a better understanding and interpretation of the data.

Secondly, the methodological approach utilised in this research has contributed to research conducted in information systems and clinical handover. This research has primarily drawn upon the principles of grounded theory in its data analysis and interpretation to obtain an understanding and generate insights into clinical handover and clinical handover improvement. These insights generated were then applied to assist clinicians in the development of clinical handover improvement strategies and the development of an electronic tool drawing on the principles of participatory design. In the process of doing so, this research has helped refine and challenged the clinicians' initial understanding of clinical handover.

10.3.3 Theoretical level

At a theoretical level, this research has identified the need to understand clinical handover from a contextual perspective, a clinical perspective and a user perspective. It is important to note that two extensive literature reviews conducted have not identified any conceptual models to assist in the understanding of clinical handover ((Wong *et al.*, 2008, Australian Council for Safety and

Quality in Health Care, 2005). More importantly, clinical handover is thought to be a well-defined clinical practice and easily understood. This research has challenged the underlying assumptions in regard to the practice of clinical handover and has provided three perspectives in which clinical handover should be understood from to assist in clinical handover improvement and to engage in discussions about clinical handover at a theoretical level. Therefore, in attempting to address the complexities in clinical handover by viewing clinical handover from three perspectives, this research has clarified that the purpose of information transfer in clinical handover is to achieve continuity of patient care through the transfer of responsibility and accountability.

10.4 Research limitations

Inherent within all research methods are strengths and weaknesses and it is important to acknowledge and demonstrate how these limitations have been addressed.

10.4.1 Scope of research

This research was based on one department in one hospital and was of an exploratory nature aimed to provide insights into the understanding of clinical handover and clinical handover improvement. A multi-snapshot was adopted over three phase of data collection to account for the multiple cohorts of junior clinicians that rotate through the department. All participants were only interviewed once but in hindsight, the consultants should have been interviewed again in Phase Three to ascertain if there were any changes in their views in clinical handover and clinical handover improvement which they presented in Phase One at the conclusion of this research.

While this research was focused on medical practitioners within the Department of General Internal Medicine, it would have been useful to observe how other healthcare professionals such as nurses or other allied health workers contributed to the clinical handover conducted. However, due to ethical constraints, the researcher was only allowed to observe the clinical handover sessions that were conducted away from the clinical practice area and other healthcare professionals were not involved in those handover sessions. This is a limitation in this research and warrants future research to explore the role of other healthcare professionals in clinical handovers.

10.4.2 Lack of generalisability

The lack of generalisability is one of the major limitations associated with case study research. This single case study conducted in one department in a hospital is not deemed to be generalisable and is not representative of other departments and other hospitals. This research however may provide some generalisability in terms of the findings presented which provide guidance on how to engage users in a clinical handover improvement initiative. It is left up to the hospitals to determine the generalisability of these findings in relation to their own hospitals.

10.4.3 Research bias

The nature of qualitative research is such that research bias can be introduced by both the researcher and the participants. The influences of the researcher on data collection, analysis and interpretation can cultivate various biases. The participant's reaction to the interviewer and the interview process, the length of the interview, the emotional state of the participants, the type of interview questions and interview setting can all contribute to research biases. Although the researcher maybe unable to prevent biases, the awareness of its presence means that it can be

taken into consideration and its impact addressed (Hall and Callery, 2001, Fad 2003). Using multiple sources of data can help reduce problems associated with research biases (Miles and Huberman 1994).

10.5 Future research

This research has provided the foundation and has opened up new areas for research in the domain of clinical handover.

This research has provided a conceptualisation of clinical handover from a contextual, clinical and user perspective. These three perspectives developed through the use of a user-centred approach provides the foundations for further work to be done to either build upon or refine what has been proposed. To the best of the researcher's knowledge there has not been any work conducted in this area.

This research has also identified that education and training and the establishment of standards in clinical handover curriculum is required. The education and training program developed and implemented as part of this project by the clinical handover project registrar serves as a foundation for future work to be conducted.

This research project has revealed that a clinical handover culture is imperative for clinical handover improvement. The user-centred approach used in this research including the introduction of the electronic tool assisted in the development of a clinical handover culture. This research has found that the incremental development of clinical handover culture is important and suggest that further research be undertaken to look at change management practices which best fit the development of clinical handover culture for future clinical handover improvement initiatives.

Cultural background and individual personalities of clinicians have been found to greatly influence clinical handover. This is an area that is lacking in research. As a result, further research should be undertaken to further understand the influence of cultural background and individual personalities on clinical handover and clinical handover improvement and identify ways in which these influences can be addressed.

The over-arching user-centred approach in this research conducted over three phases should be considered in future research in clinical handover and clinical handover improvement in other departments and other hospitals. This will contribute to further discussions in user-centred approaches and quality and safety in healthcare.

10.6 Chapter reflections

In conclusion, this research has provided an in-depth understanding of clinical handover and clinical handover improvement at the Royal Hobart Hospital's Department of General Internal Medicine using a user-centred approach over three phases. It has highlighted the importance of adopting a multi-snapshot approach when conducting research into clinical practices that are not clearly defined. This research has also shown that user requirements and insights obtained from data analysed drawing on the principles of grounded theory can be used to facilitate the

development of an electronic tool. Further data collection after the introduction of the electronic tool can be used to inform the conceptual understanding of the clinical handover practice.

This research has made significant contributions at a substantive, methodological and theoretical level. At a substantive level, it has contributed to the understanding of clinical handover and clinical handover improvement, the use of electronic tools in clinical handover improvement and conducting IS research conducted in a clinical setting. At a methodological level, it has illustrated the importance of the use of a multi-snapshot case study to understand the practice of clinical handover and has contributed to the use of methods drawing on the principles of grounded theory to generate an understanding of the process of clinical handover and assist in the development of an electronic tool drawing on the principles of participatory design for clinical handover improvement. At a theoretical level, it has identified the need to understand clinical handover from a contextual, clinical and user perspective.

This research has laid the foundations for future research to occur in the domains of clinical handover and more broadly, quality and safety.

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Appendix 1: Clinical handover guidelines

Clinical handover guidelines

The guideline will cover most aspects of clinical handovers for the Department of General Internal Medicine, Royal Hobart Hospital for morning handovers.

Expected participants

- All general medical interns and registrars
- Evening and night medical seniors
- Night intern and night medical registrar
- Post-take consultant physician
- Advanced trainees in medicine specialties

Time course

- Breakfast should be consumed prior or after the handover, beverages maybe consumed during handover.
- All participants are expected to be on time and handover start at 08:00a.m.
- Handover should be closed by 08:30 a.m.

Leadership

The role will be taken by one of the following, who will also fill in the clinical handover sheet.

- Clinical Handover project registrar
- Post-take consultant
- Post-take registrar or night registrar

Capping rules

- “Capping” is to be implemented, if units B, C, PU or E reach inpatient numbers of > 25. This number is 30 for medical unit F.
- Distribution of excess patients will commence with the unit with the fewest numbers of inpatients and the furthest away from admission day, which may include the unit of the day where that unit has less than 10 current inpatients.
- One patient will be handed to each unit. Units will only stop receiving patients, when their number reach 25 (30 for Med F) or on-take unit reach 10. All excess patients are distributed in this manner.
- On most occasions, the patients to be distributed under the capping system are those admitted by the night medical registrar. The patient admitted last, will be the first to be “capped” to the other units. On-take unit cannot choose which patient to be “capped” off to other units.
- Handover of patients is completed during this session only. Juggling of patients between units is not acceptable. All concerns regarding hand-backs and capping are to be discussion at the end of the formal morning handover session as a group.

- Common sense must prevail with the handover of patients and the implementation of the “capping” rule, with acute and non-acute patients on a unit and other factors taken into consideration.
- Units without a registrar should never receive any “capped” patients.
- The leader of clinical handover is the final arbiter in all decisions related to assignment of patients to units.

Important information to be documented

It is important that the following information be documented during morning handover, and the handover sheet be filled in by the clinical handover leader each day and the sheet be forwarded to the Department of General Internal Medicine in person or by internal mails.

- Attendance of each individual and punctuality.
- When “capping” rule is implemented and the number of patients (with URN) capping to each units.
- Hand-back patients.
- Mortality during the last 24 hours (or weekend) under any general medical team.
- Rostering or man power deficiencies and allocation of a covering body/person.
- Issues from night interns, medical seniors and registrars.
- Any issues arising that required further discussions.

Notices or other issues

Mortality

- All mortalities under the care of general medical units, should be reported to the clinical handover leader, with patients’ URN, unit and consultant in-charge.
- All weekend mortalities should be reported on Monday.
- Interns should be reminded to forward the notes to Department of General Internal Medicine, once death certificate and summary are written.

Staff absence

- Staff absence will be noted and possible coverage of the unit discussed during handovers.
- The unit consultant will be notified by clinical handover leader or the night registrar.
- Unit without a registrar is not to receive handback patient or capped patient.

Notices

- Notices for meetings, educational activities could be briefly provided after the formal handover process.
- Potentially debatable issues will be formally noted by the clinical handover leader and discussion will take place during GIM case study, such political issues or perceived medical errors.
- We will develop evening and night handovers throughout the year.

Clinical handover order of proceedings

- STEP 1. Establish the clinical handover leader.**
- STEP 2. “Capping” system**
- i. Establish patient numbers of “on-take” units, and each unit.
 - ii. Highlight if the “CAPPING” system to be activated.
 - iii. Refer to the “CAPPING” guideline for patient allocation.
- STEP 3. Highlight definite or potential consults to advanced trainee.**
- STEP 4. Night registrar**
- i. To present cases which might need specialty input first.
 - ii. Other new admissions.
 - iii. Consultations from wards.
- STEP 5. Medical senior**
- i. Night medical senior to present admissions to be “handed back” under the 12 months guidelines.
 - ii. Evening medical senior.
 - iii. Please state the UNIT, CONSULTANT, WARD, URN clearly at the beginning of the presentation.
- STEP 6. Night interns and potential consults.**
- i. Issues on the ward overnight, especially unstable patients.
- STEP 7. Unknown or incorrectly listed patients**
- i. Each unit to check and notify “unknown” patients or “incorrectly listed” patients.
- STEP 8. Mortality within the last 24 hours.**
- i. Report of mortality within the last 24 hours (or over the weekends).
 - ii. Please report the unit and URN of the patient.
 - iii. Reminder to interns to forward the case notes to Department of General Internal Medicine.
- STEP 9. Notices**
- i. Staff absence to be reported.
 - ii. Reminder for meeting scheduled for the day.
 - iii. Other notices or issues arising.

Note for Monday

- Start with handbacks from Friday on-take unit, followed by Saturday and Sunday handbacks, and then follow the above agenda.

Appendix 2: Clinical handover manual



Clinical handover manual

Department of General Internal Medicine
Royal Hobart Hospital

Prepared by

XXXXXX

And

XXXXXX

Table of contents

- The responsibility to handover patient care
- The responsibility to accept patient care
- The responsibility to hand-back patient care
- End of term handover
- The information that will need to be handed over
 - Issues
 - Action
 - Comment/management plan
- Information categorisation
 - Category 1
 - Category 2
 - Category 3
- Content of handover message
 - A five step approach
- Examples
 - Example 1: Improvement in the provision of comments.
 - Example 2: Lack of information
 - Example 3: Unnecessary handover
 - Example 4: Clear direction

Introduction

Handovers are important to ensure continuity of patient care.

To make the life of after-hours staffs easier, it is important to handover adequate information for action. It is also important to assign handover information a priority, so that we can ensure urgent issues are addressed first.

The responsibility to handover patient care at shift changes cannot be emphasised enough as it forms the basis for safe patient care. It is everyone's business and we expect face-to-face AND written handover to occur during every change of shift, i.e. day team to evening team, evening team to night team and night team to day team.

Responsibility to accept handover

It is the responsibility of the incoming team to receive and accept handover. Therefore, it is expected the incoming team to be present at the following time to receive clinical handovers.

- Morning 08:00 to 08:30, all general medical registrars, interns, weekend medical seniors.
- Evening 16:30 to 17:00, the evening intern, and preferably the evening registrar
- Night 21:30 to 22:00, both evening interns, registrar and medical senior.

These handover sessions for the Department of General Internal Medicine take place in the 5th floor tutorial room.

On public holidays and weekends, the evening handover is not necessary.

Responsibility to accept hand-back of patient care

It is essential that if you order some investigations for patients not under your team, or alter the management plan for patients not under your care, that you hand that information back to the team which is going to look after them. It is also essential that the home team be informed about all MET calls, code blues and mortality.

End of term handover

At the end of your rotation/term, it is very important for you to provide the incoming intern to your unit with a thorough handover of all the patients under the care of your team, especially the specific issues or investigations that need to be followed up. It is also useful for you to provide some tips about how to function within the specific team.

Information that needs to be handed over

- ***Issues***
 - Issues are background information about the patient. Issue list should be concise and provide a holistic view of the patient
 - It should contain information necessary for the action required and recommendations provided.
 - Common abbreviations can be used
- ***Action***
 - This is a one line sentence to indicate the action that you want the receiving team to do.
 - This section should be direct and specific
 - Investigations ordered and requiring review should appear on this section.
- ***Comment/recommendations***
 - This is to provide some recommendations to best manage the patient.
 - This is especially important if action is to check blood test results, then the receiving team should have some guidance as to what to do with the results.
 - Recommendations and comments should be short, specific and provide essential information.
 - It is acceptable to indicate that details for management are documented in patient's progress notes.

Information categorisation

A lot of information is provided during shift changes. It is essential that you indicate the URGENCY and IMPORTANCE of your message. In order to combine the two into a simple system, we have developed an information categorisation system, based on these two variables.

- ***Category 1***
 - They are either URGENT or IMPORTANT or both.
 - Patient requires attention within the first two hours of the new shift should ALL be category 1.
 - Any NEW issues, which the causes are being investigated should be classified as category 1, examples are
 - Chest pain
 - New onset SOB
 - GI bleeding
 - Severe abdominal pain
 - New onset of persistent headache
 - Low urine output
 - Acute renal failure
 - Altered conscious state
 - Dropping haemoglobin
 - Patients who might need registrar's input.
 - Patient who has a potential life-threatening condition.

- **Category 2**
 - They mainly consist of results to be chased up, but WITHOUT a life-threatening condition.
 - They may also include NON-urgent jobs
 - Some examples of category 2 patients include
 - Check Hb after transfusion
 - Cannula for antibiotics
 - Check CXR after CVC/PICC/NGT insertion
 - Review patient with a rash
 - Check K⁺ after replacement
- **Category 3**
 - This category is information which might be useful for the receiving team.
 - The information may be important under certain circumstances.
 - Some examples of category 3 include
 - This patient is not for intubation or ICU
 - This patient has a rash noted, no action required
 - This patient has chest pain, but not for further intervention other than medical therapy
 - Highlight issues regarding communications with relatives
 - Indicating to call a consultant if any issues with particular patients.

In any circumstances, when you are uncertain of the category, please choose the more urgent category.

Content of handover messages: Five step approach

- **Step 1:** Think for your colleague (what do they want to know, what do they need to know in order to carry out the action properly)
- **Step 2:** Background information: Provide a short issue list that is RELEVANT to the action required.
- **Step 3:** Action: Action is a few words to describe what you want the receiving team to actually do.
- **Step 4:** Comments: For each background issue or action, there should be a comment to describe “what if” as it is much easier for you to come out with a recommendation than your peers.
- **Step 5:** Assign a category that reflects a priority for the handover.

Examples

Example 1

Handover message:

Bloods Sunday □
Please rv Hb aim > 100 + CRP
Transfused 2 units 29/12/05
Wound swab □

Please rv sensitivity

Instead of the above, the handover message can be improved by:

Issues:

1. Anaemia due to GI bleeding, no further melaena.
2. Wound infection of lower limb, on flucloxacillin

Action

1. Check haemoglobin on Sunday
2. Chase up wound swab results.

Comments

1. Transfuse if Hb < 100 and recheck Hb.
2. Change antibiotics according to sensitivity if needed.

Urgency of message: **CATEGORY II**

Example 2: Lack of information

Handover message:

*Hypona⁺
U&Es daily*

Instead of the above, the handover message can be improved by:

Issues:

1. Hyponatraemia, asymptomatic, secondary to nausea and vomiting.

Action:

1. Daily monitoring of U&E

Comments:

1. If worsening hyponatraemia, assess fluid status and determine fluid needs/restriction.

Urgency of message: **CATEGORY II**

Example 3: Unnecessary handover

Handover message:

*Basically awaiting placement
Mobility issues → has had a L1/L2 #
Shouldn't be any major issues*

Comment:

Is this someone that you want your colleague to do something about? If not, it is safe to leave them off the list.

Example 4: Clear direction**Issues:**

1. 58 year old man with intracerebral haemorrhage, comfort care.

Action:

1. Syringe driver if requested by nursing staffs.
2. Please inform consultant XXX when patient passed away.

Comment:

1. Directions for upscaling syringe driver doses in patient notes

Urgency of message: **CATEGORY III**

Appendix 3: Handover sheet

Name and location	Current issues	Fri	Sat	Sun	Mon

Appendix 4: Functional specifications

Clinical handover project functional specifications

Version 1.0

20 November 2006

General

- A new record is created when a patient is admitted to hospital
- Handover notes apply to a patient for the duration of their admission.
- If a patient is re-admitted, previous handover notes are not relevant and not linked to the patient.
- An admission record will always be in one of the following states
 - New admission
 - Discharged
 - Patient deceased.
- An admission record remains active only when in the *New admission* state.

Assumptions

- Homer database is correct and current.
- The following eGate msg are generated
 - Patient admitted
 - Patient moved
 - Patient discharged
 - Patient deceased
 - Modification to patient details (Name, Age, Ward, Consultant)
- DHHS will assistance in:
 - directing Homer and Kestral messages to Clinical handover
 - provide message specifications for each message type
 - provide the relevant LDAP information for user authentication
 - server name
 - LDAP tree structure

Navigation

- Excluding the login screen, the left-hand side navigation bar will display *Go back to Main menu* and *Logout* hyper links for all screens

Login

- User specifies username/password (current DHHS network login)
- Use LDAP to authenticate user

Security

- No security levels – all users subjected to the same security restrictions
- All users can
 - search for patients
 - view patient details
 - access the handover list (all reports)
 - create new hand over notes (issue/action/comment)
 - edit the *current* hand over note (issue/action/comment) they have created
 - delete a *current* handover note (issue/action/comment) they have created
 - view *current* handover notes
 - view historical handover notes
- Users CANNOT
 - edit hand over notes (issue/action/comment) created by someone else
 - delete hand over notes (issue/action/comment) created by someone else
 - edit or delete ANY historical handover note (regardless if they created it)

Search

- Only search active admissions
- All users can search by
 - name (wild card search on surname and/or first name)
 - URN
 - Unit
 - Handover list
 - New admissions
- Users can also specify the result view
 - Patient List
 - Handover list

Results page (2 different results – Ward list and Handover list)

- Matching search list displayed
- Search display columns. The following information is displayed as part of the search results
 - Category
 - Patient details <URN> <Patient name> <Age> <Gender>
 - Ward / Bed
 - Pathology results
 - Consultant
 - Handover icon:
 - *view* – only display if *current* note exists
 - *Add*.
- User can sort by search result column headings – click once for ascending order, click again for descending order.
- Default sort order is by *Ward*
- Status icons (add/view handover note) are hyper links that:
 - *view* - takes user to *Patient Details* page (Current notes on display)
 - *Add* - takes user to *Add Issue* screen on Patient Details page.
- Users can print out results page.

- *Print* takes user to a printer-friendly HTML page and automatically fires the *print* command.
- The print friendly HTML page is displayed in a new browser window. A user can close this window to return to the search result page.
- New search button exists which takes user back to the search page.

Patient Details

- Patient details – read only
- Patient category.
 - This can be updated by any authenticated user
 - Selectable from a drop down list
 - Values will be provided by client
 - If value is changed, *Save* button enables, allowing the user to save the change.
 - Once saved *Save* button is disabled.
- Issues
 - Issues list will display
 - issue detail
 - time issue recorded
 - person who recorded issue
 - Issues will remain current while:
 - less than 24 hours past since it was recorded
 - **AND** all related actions have been completed
 - Issue will remain current if greater than 24 hrs old, and some actions are uncompleted
 - Once expired, issue detail will only be accessible from the *View History* screen.
 - New issues can be added by clicking on the *Add New* tab
 - When a new issue is saved
 - *Add action* screen automatically loaded
 - User can add one or more actions – repeat *add* until *cancel* clicked.
 - On *Add Action* cancel, *Add Comment* screen is automatically loaded.
- Actions
 - Actions are related to an issue
 - An issue may have 0, 1 or more actions
 - Actions list will display:
 - Action detail
 - time recorded
 - recorded by
 - issue relating to
 - whether it has been completed
 - Actions will be sorted by issue order
 - Actions will remain current (regardless if they have been completed or not) as long as the issue is current.
 - To complete an action a user must
 - double-click on the action
 - select *Confirm* from the pop-up dialog box (*Action completed*)
 - When confirmed, date/time of completion and *by whom* is recorded. *By whom* determined from user login

- Once expired, action detail will only be accessible from the *View History* screen.
- New actions can be added by clicking on the *Add New* tab – relating issue to be specified in the *add action* screen.
- Comments
 - Comments are related to an issue
 - An issue may have 0, 1 or more comments
 - Comments list will display:
 - Comment detail
 - time recorded
 - recorded by
 - issue relating to
 - Comments will be sorted by issue order
 - Comments will remain current as long as the issue is current.
 - Once expired, comments detail will only be accessible from the *View History* screen.
 - New comments can be added by clicking on the *Add New* tab – relating issue to be specified in the *add comment* screen.

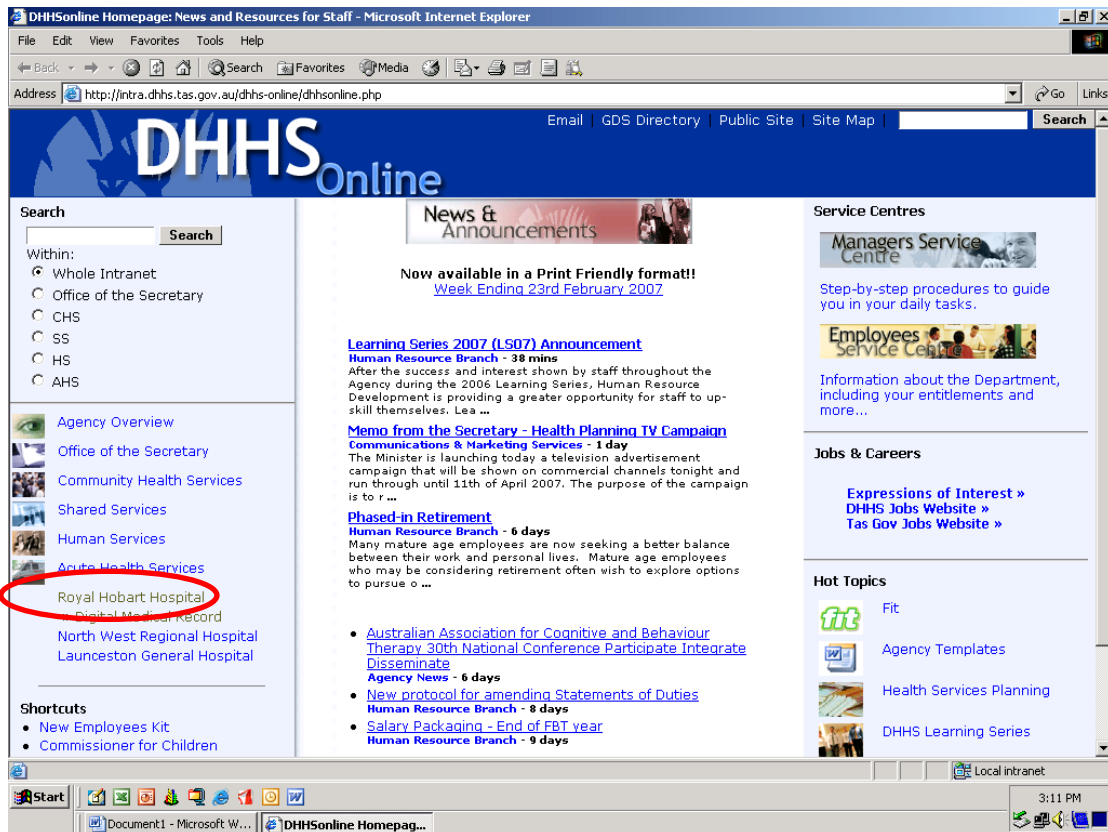
Appendix 5: User manual for the electronic tool



**Royal Hobart Hospital
Department of General Internal Medicine**

Electronic Clinical Handover User Manual

How to access the Electronic Clinical Handover Program

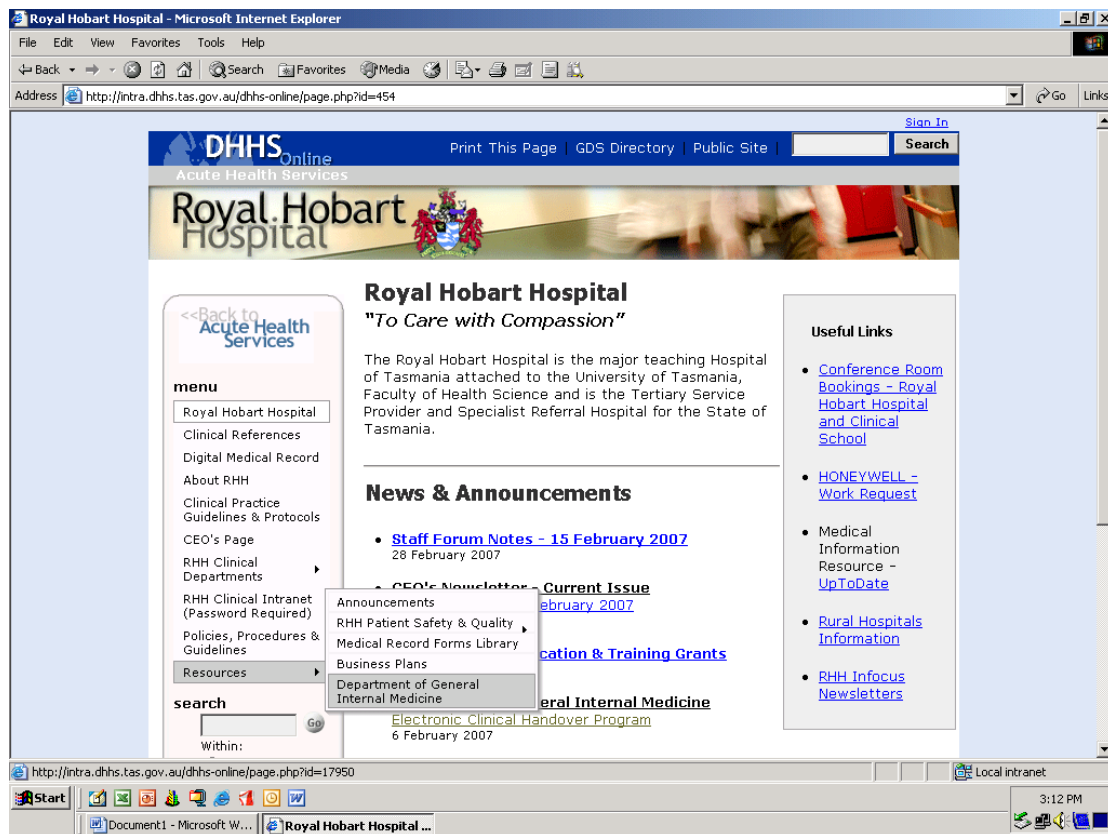


To access the Department of General Internal Medicine (DGIM)'s Electronic Clinical Handover system, go to the DHHS intranet available on <http://intra.dhhs.tas.gov.au/dhhs-online/dhhs-online.php>.

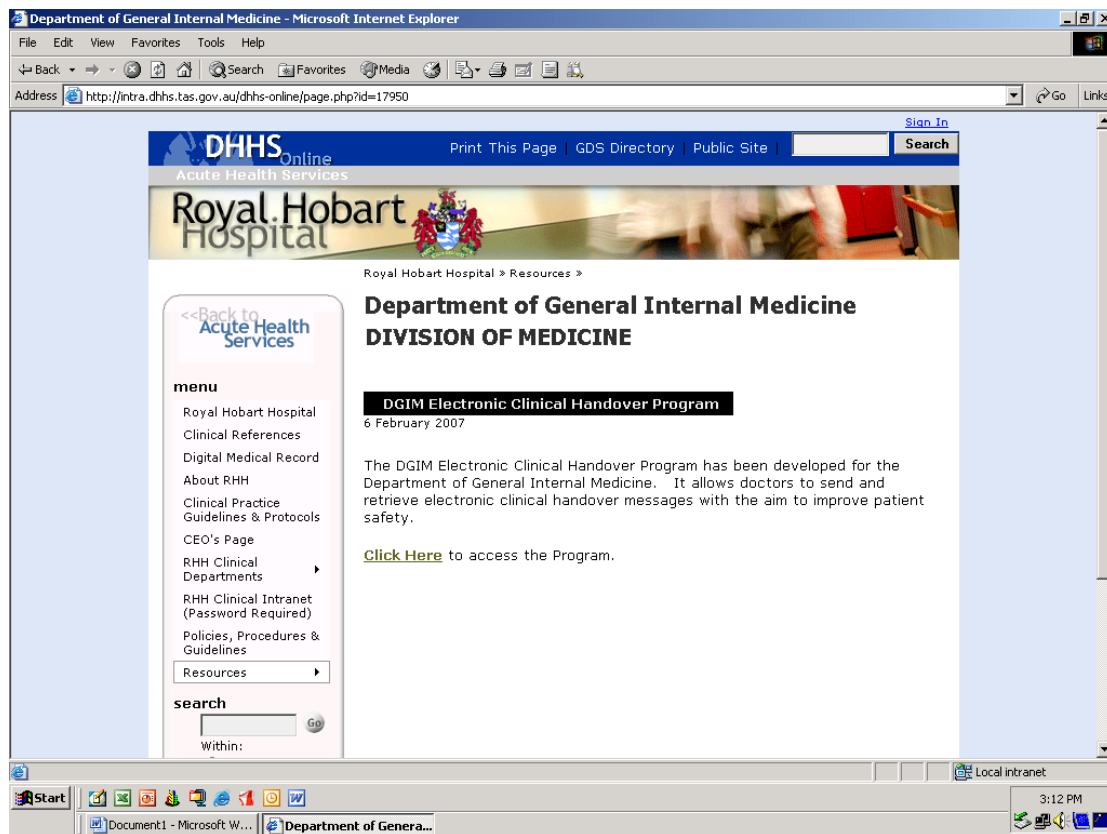
Click on "Royal Hobart Hospital".



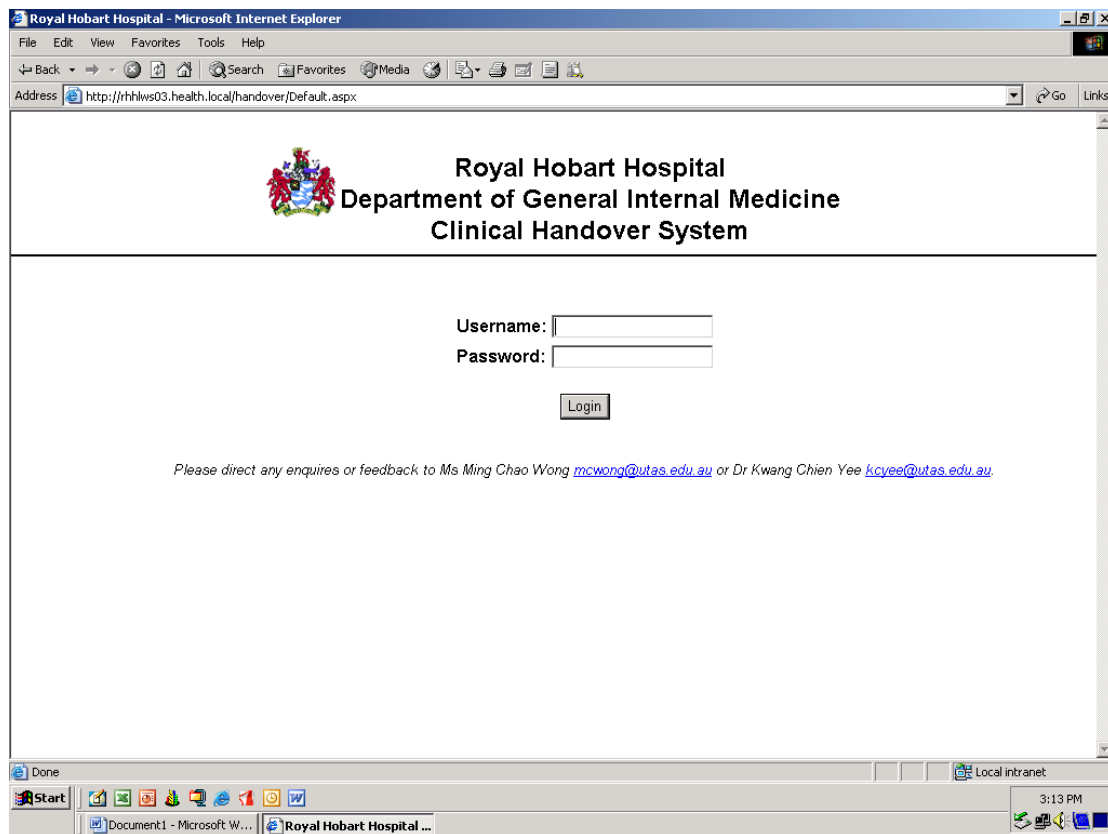
Click on “Resources” on the Royal Hobart Hospital’s web page.



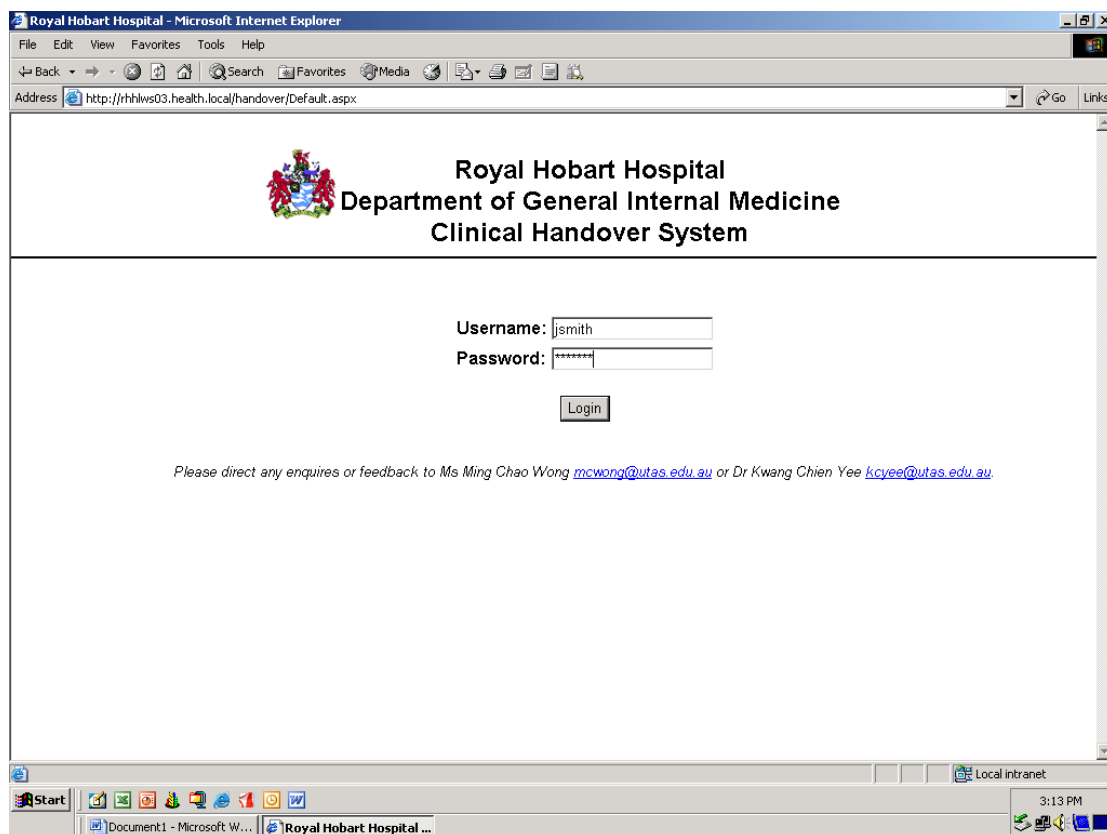
Select “Department of General Internal Medicine” from the list.



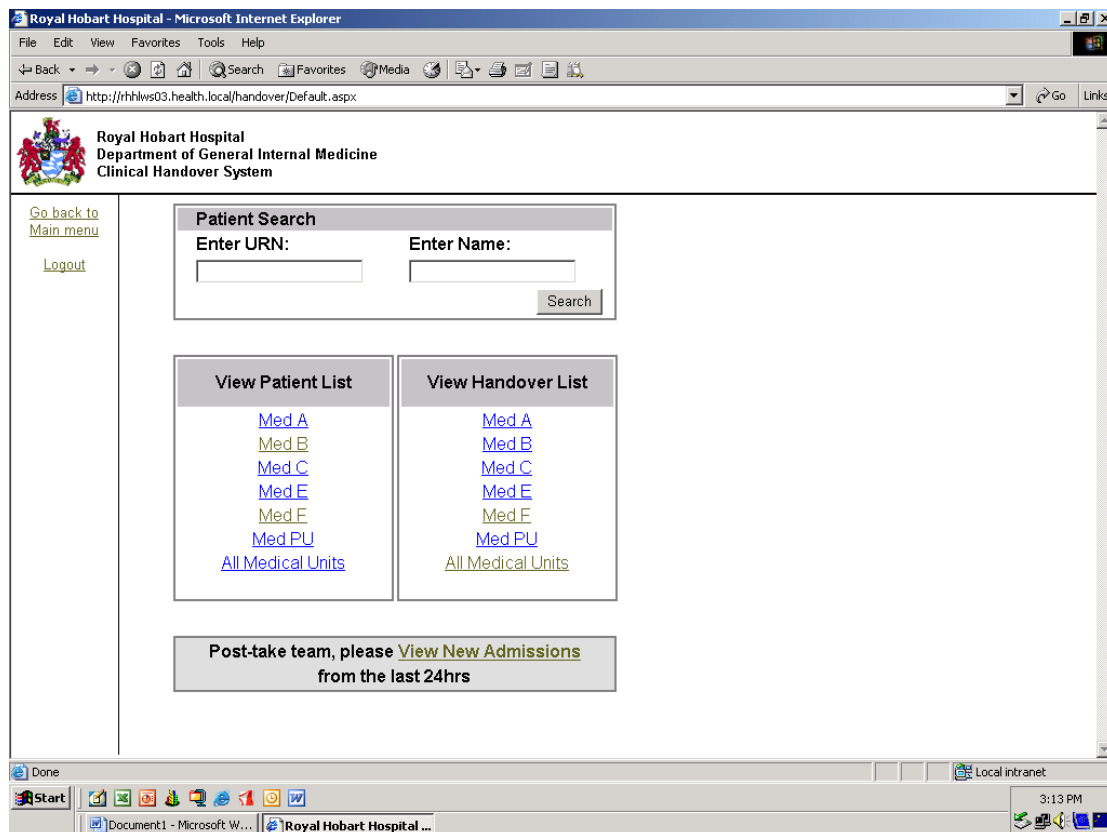
This page allows you to access the DGIM Electronic Clinical Handover Program.



You will need your DHHS username and password to access the program.

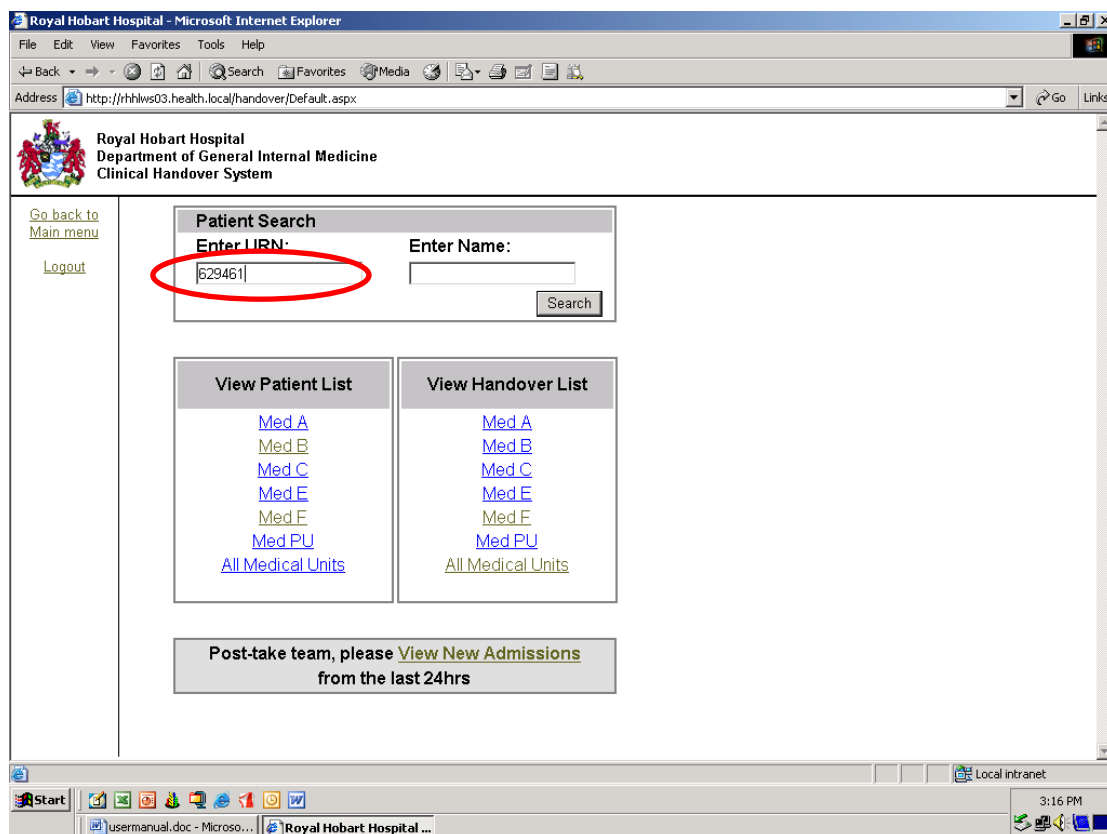


Type in your username and password as required and click “Login”.

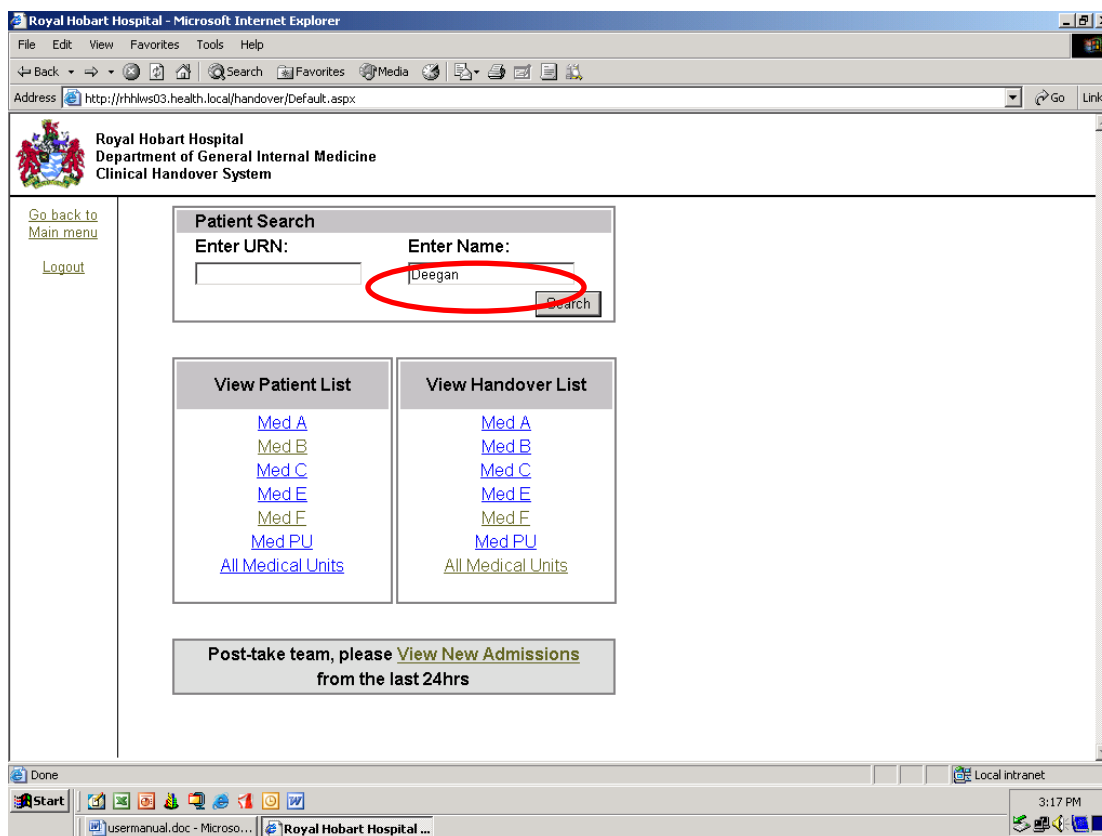


This is the main menu. From the main menu, you can

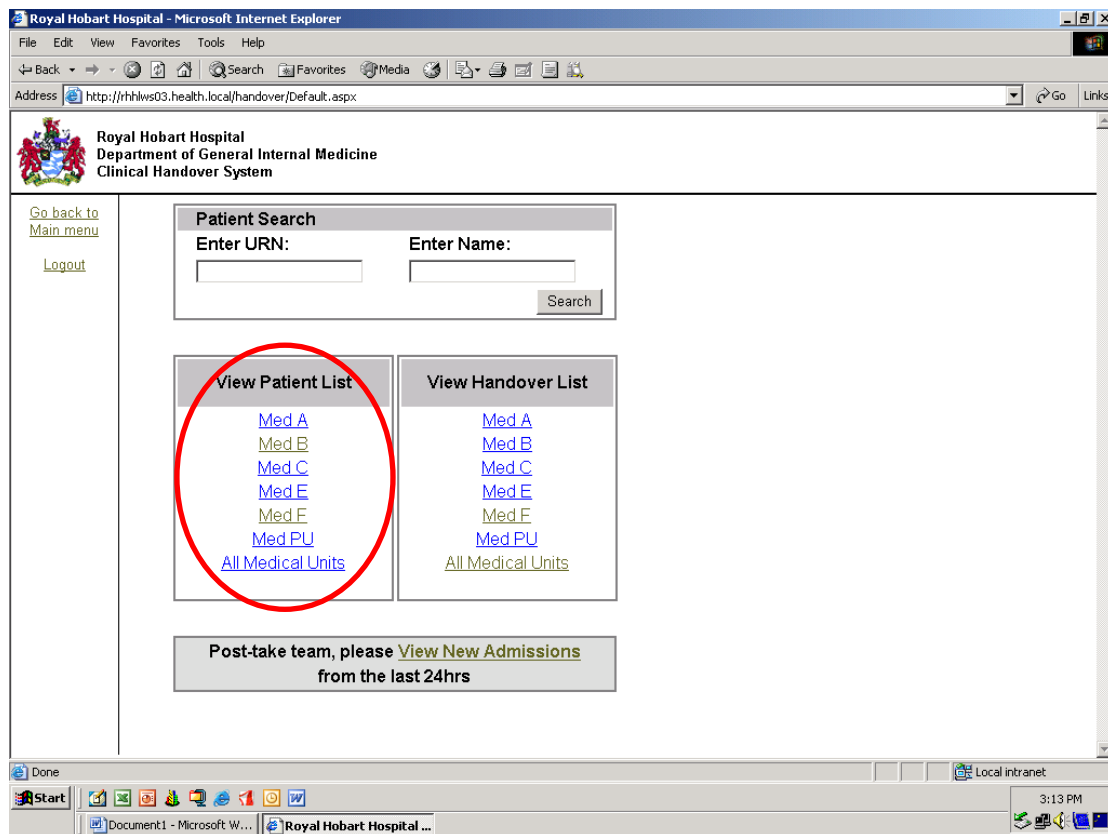
- Search for a patient by using their URN or First Name and/or Last Name
- View the Patient List according to Medical Units
- View the Handover List
- View New Admissions over the last 24hrs



To search for a patient using their URN, type in their URN in the space provided and click “Search”.



To search for a patient using their First Name and/or Last Name, type in their First Name and/or Last Name into the space provided and click “Search”. For example, if you would like to search for Michael Deegan, you can either type in “Michael” or “Deegan” or “Michael Deegan”.



To view the Patient List, click on the respective Medical Units or “All Medical Units” if you want to view all the patients in DGIM.

Royal Hobart Hospital - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media

Address http://rhhws03.health.local/handover/Default.aspx Go Links

Department of General Internal Medicine
Clinical Handover System

[Go back to Main menu](#)
[Logout](#)

Med F Patient List (Thu, 01 Mar 2007)

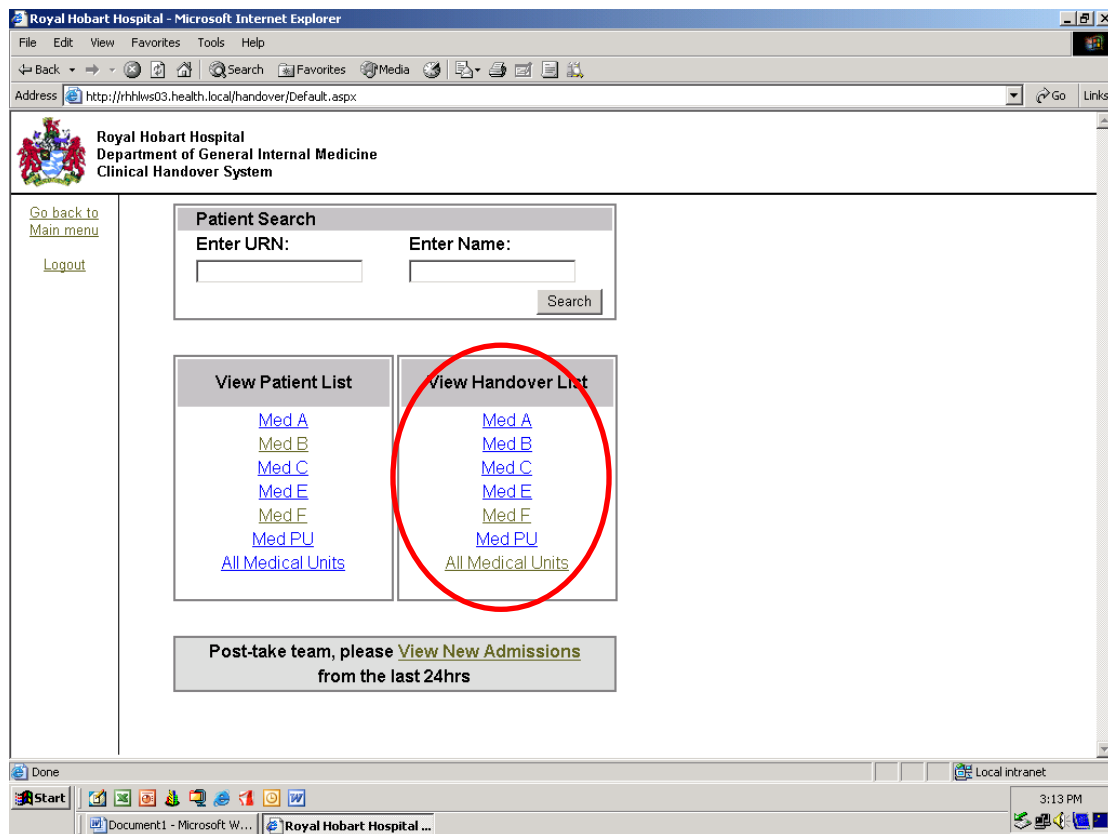
H'over Notes	Patient Details	Ward	Consultant	Pathology Results		
	XXXXXXXX	2BS-SH	XXX	Hb 142g/L MCV 94fL WCC 5.80/hL Neut 3.7hL Platelet 229hL	Na 138mmol/L K 4.5mmol/L Urea 8.1mmol/L Creat 104umol/L Ab N/A	CRP N/A INR 1.0secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-SH	XXX	Hb N/A MCV N/A WCC N/A Neut N/A Platelet N/A	Na N/A K N/A Urea N/A Creat N/A Ab N/A	CRP N/A INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-SH	XXX	Hb 129g/L MCV 93fL WCC 7.11/hL Neut 4.8hL Platelet 392hL	Na 138mmol/L K 3.7mmol/L Urea 5.1mmol/L Creat 81umol/L Ab N/A	CRP 62mg/L INR 1.4secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-SH	XXX	Hb 115g/L MCV 95fL WCC 7.0x10 ⁹ /L Neut 6.2hL Platelet 622hL	Na 136mmol/L K 4.4mmol/L Urea 5.9mmol/L Creat 96umol/L Ab 20g/L	CRP 200mg/L INR 1.3secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
	XXXXXXXX	2BS-SH	XXX	Hb 116g/L MCV 83fL WCC 7.95/hL Neut 5.2hL Platelet 326hL	Na 142mmol/L K 3.8mmol/L Urea 5.2mmol/L Creat 89umol/L Ab 38g/L	CRP 11mg/L INR 2.2secs D-dimer N/A Trop(1 st) 0.00ug/L Trop(2 nd) 0.04ug/L
	XXXXXXXX	2DC	XXX	Hb N/A MCV N/A WCC N/A Neut N/A Platelet N/A	Na N/A K N/A Urea N/A Creat N/A Ab N/A	CRP N/A INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
		2DC		Hb N/A MCV N/A	Na N/A K N/A	CRP N/A INR N/A

Print Back

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This is an example of a Patient List. The Patient List is sorted by Ward and then by Consultant.




To view the Handover List, click on the respective Medical Units or “All Medical Units” to view all patients that have been handed over.

Royal Hobart Hospital - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print

Address http://rhhws03.health.local/Handover/Default.aspx Go Links

 **Royal Hobart Hospital**
Department of General Internal Medicine
Clinical Handover System

[Go back to Main menu](#)
[Logout](#)

Handover List (Thu, 01 Mar 2007, 15:26)

Category	Patient Details	Ward	Pathology Results			Actions
2	XXXXXXXX	2BS	Hb N/a	Na N/a	CRP N/a	Action 2
			MCV N/a	K N/a	INR N/a	Action 1.1
			WCC N/a	Urea N/a	D-dimer N/a	Action 1
			Neut N/a	Creat N/a	Trop(1 ⁴⁵) N/a	
			Platelet N/a	Alb N/a	Trop(2 ⁴⁵) N/a	

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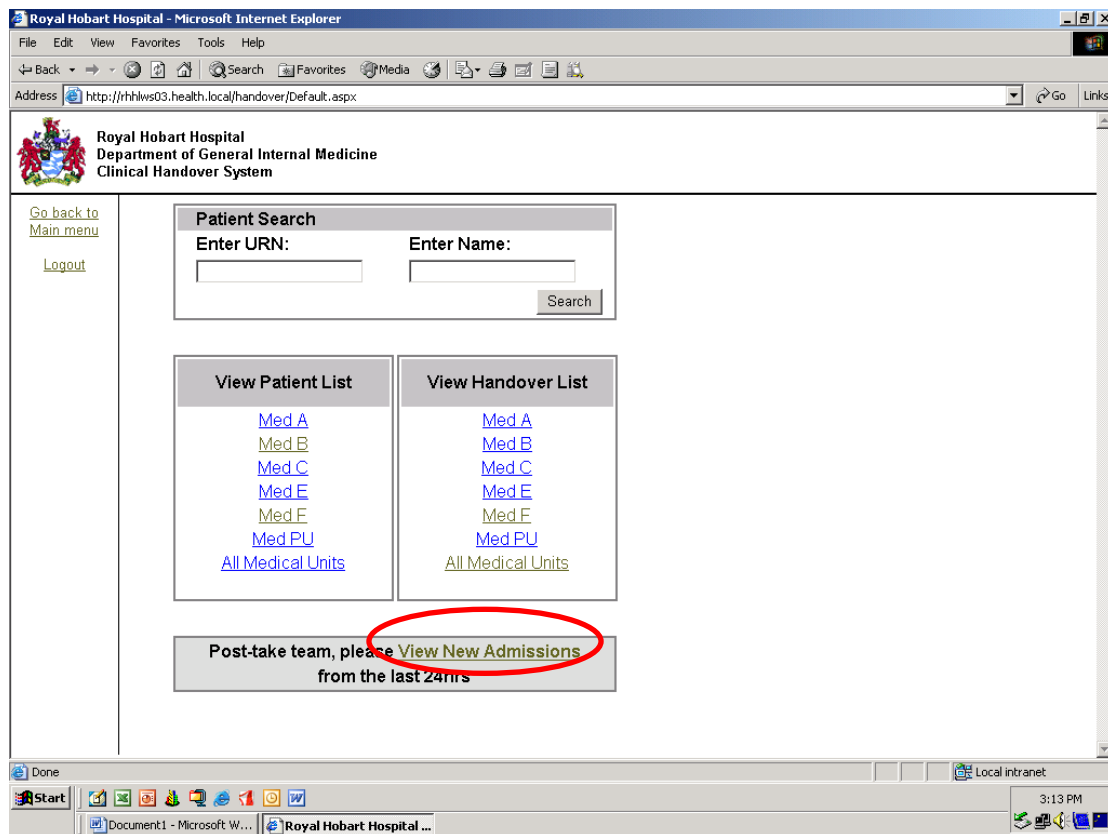
Start 3:26 PM

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This is an example of a Handover List. The Handover List is sorted by first by category and then by Ward.

The Category column dictates how urgently the patient needs to be seen (1-Very urgent, 2-Needs to be seen within shift, 3- For your information).

The Actions Column dictates what needs to be done to that patient.



To view New Admissions over the last 24hrs, click “View New Admission”. It is recommended that the post-take team cross check this list with their Patient List to ensure that no patients have been left out.

Royal Hobart Hospital - Microsoft Internet Explorer

File Edit View Favorites Tools Help








Back Search Favorites Media

Address http://rhhhs03.health.local/Handover/Default.aspx Go Links

Department of General Internal Medicine
Clinical Handover System

Go back to Main menu
Logout

Admissions over the last 24hrs (Thu, 01 Mar 2007)

H'over Notes	Patient Details	Ward	Consultant	Pathology Results		
	XXXXXXXX	2BS-S	XXX	Hb 90g/L MCV 97fL WCC 7.43/hL Neut 6.4h/L Platelet 263/hL	Na 140mmol/L K 4.0mmol/L Urea 8.8mmol/L Creat 86µmol/L Ab 19g/L	CRP N/a INR N/a D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a
	XXXXXXXX	2BS-S	XXX	Hb 125g/L MCV 94fL WCC 9.35/hL Neut 5.1h/L Platelet 351/hL	Na 138mmol/L K 3.4mmol/L Urea 16.1mmol/L Creat 143µmol/L Ab 23g/L	CRP N/a INR N/a D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a
	XXXXXXXX	2BS-S	XXX	Hb 118g/L MCV 94fL WCC 6.27/hL Neut 4.4h/L Platelet 372/hL	Na 135mmol/L K 4.7mmol/L Urea 5.8mmol/L Creat 74µmol/L Ab 26g/L	CRP N/a INR 1.1secs D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a
	XXXXXXXX	2BS-SH	XXX	Hb 129g/L MCV 93fL WCC 7.11/hL Neut 4.8h/L Platelet 392/hL	Na 138mmol/L K 3.7mmol/L Urea 5.1mmol/L Creat 81µmol/L Ab N/a	CRP 62mg/L INR 1.4secs D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a
	XXXXXXXX	2DC	XXX	Hb 75g/L MCV 90fL WCC 14.30/hL Neut 13.0h/L Platelet 540/hL	Na 132mmol/L K 4.4mmol/L Urea 6.8mmol/L Creat 117µmol/L Ab N/a	CRP N/a INR 1.0secs D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a
	XXXXXXXX	2DC-SH	XXX	Hb 149g/L MCV 98fL WCC 5.32/hL Neut 3.7h/L Platelet 285/hL	Na 128mmol/L K 2.9mmol/L Urea 4.0mmol/L Creat 77µmol/L Ab 40g/L	CRP <5mg/L INR N/a D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a
	XXXXXXXX	2DC-		Hb 147g/L MCV 90fL	Na 140mmol/L K 4.0mmol/L	CRP N/a INR N/a

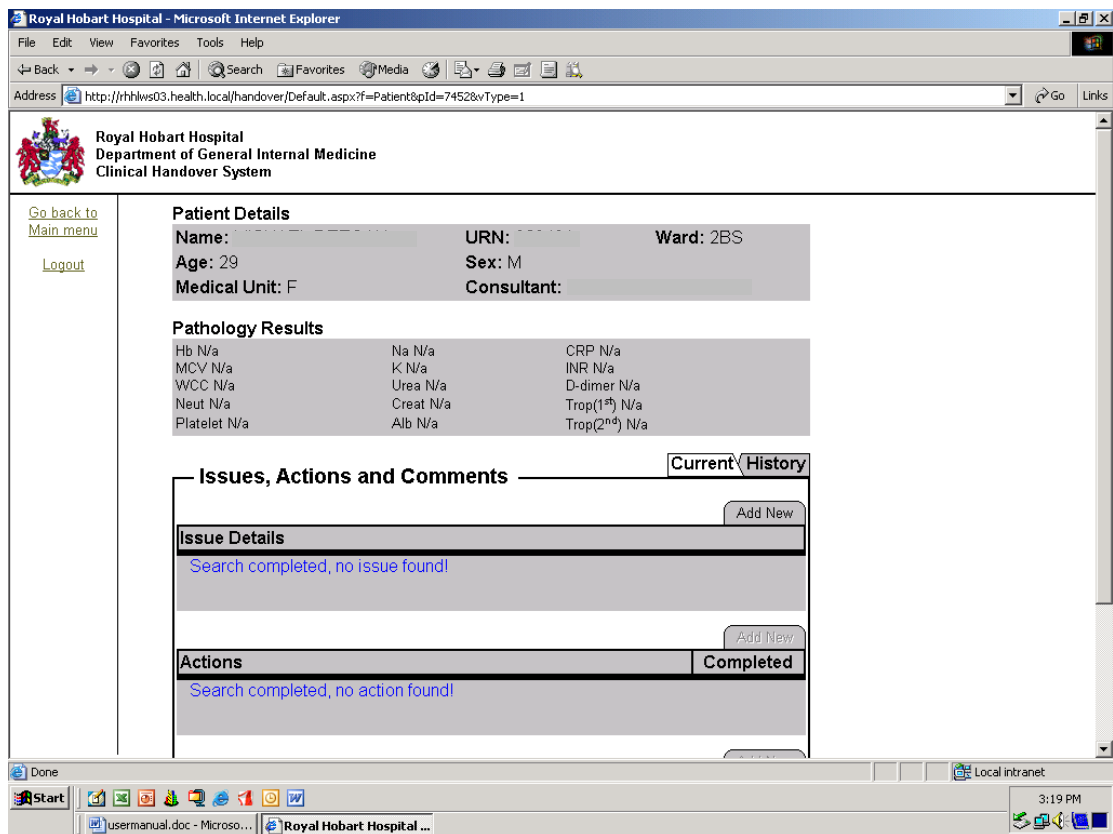
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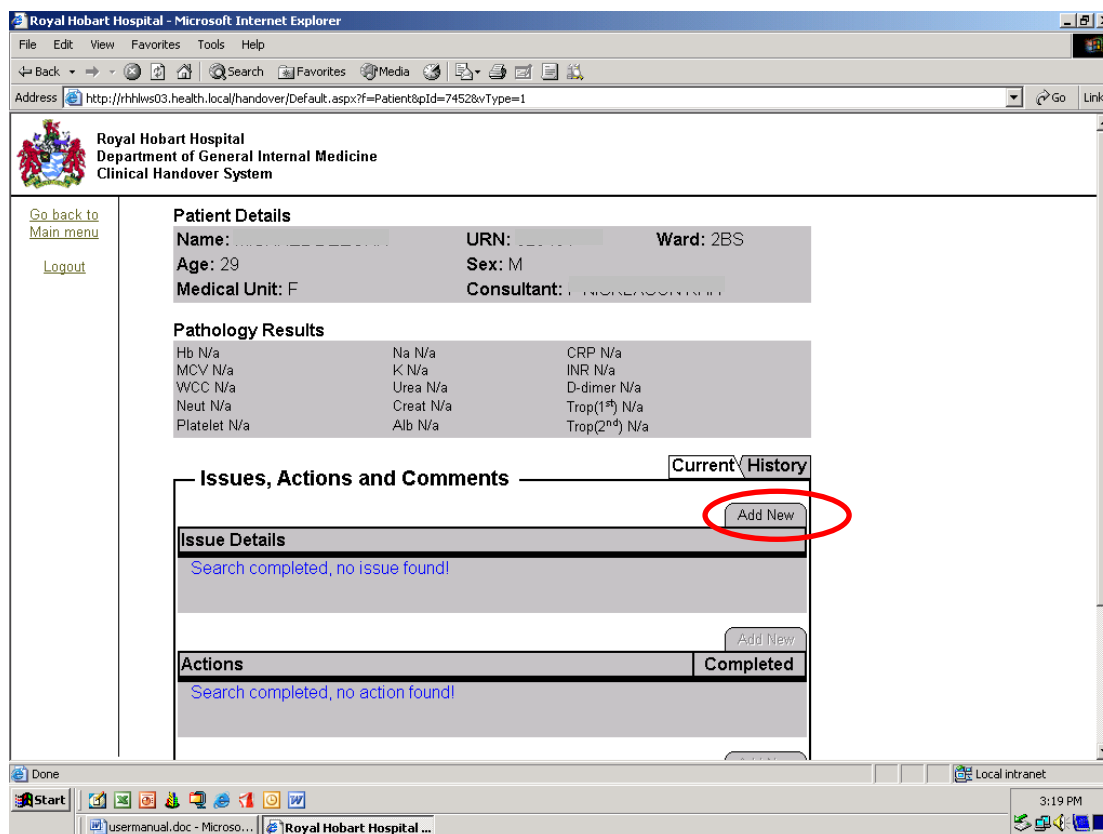
This is an example of the list of admissions over the last 24hrs.

Entering/editing handover information

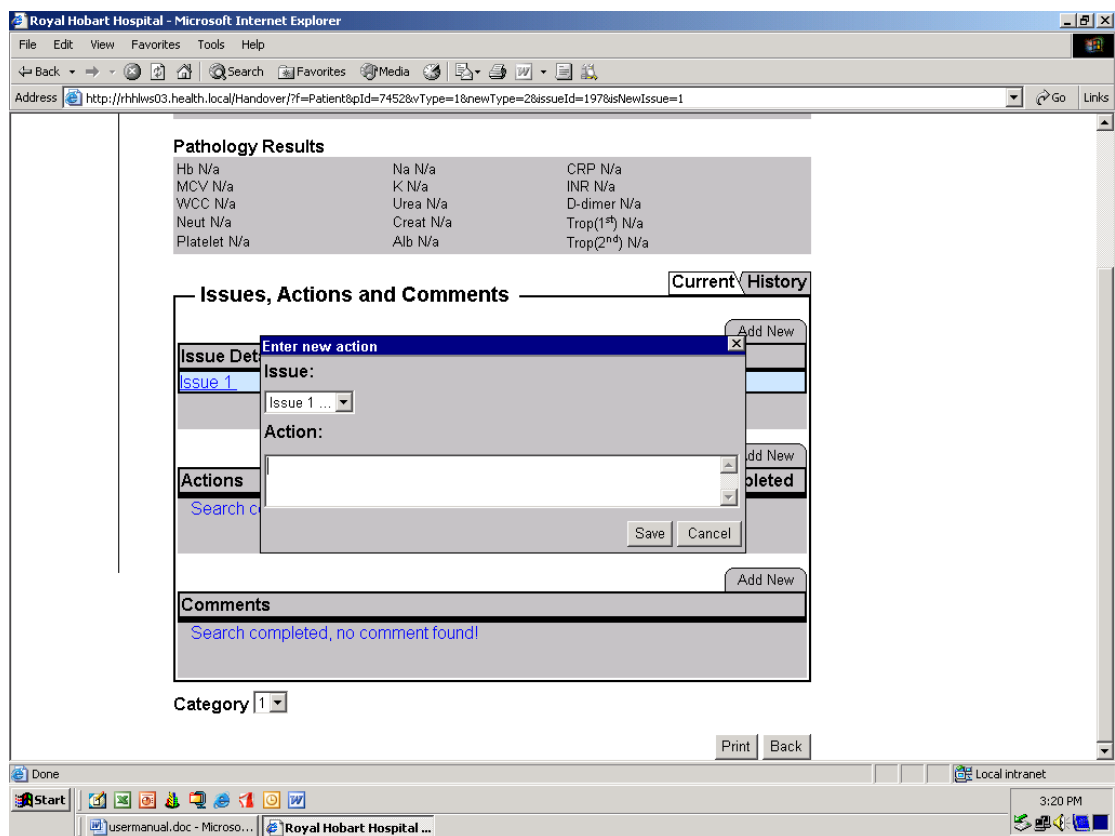


This is an example of the Patient Details page. You can enter handover information here.

To access this page, click on the patient's name from either the Patient List or the Handover List.



To enter a new issue, click "Add New".



You will then be prompted to enter an action that is associated with the issue.

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File Edit View Favorites Tools Help

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Address http://rhhws03.health.local/Handover/?f=Patient&pId=8624&vType=1&newType=2&issueId=205&isNewIssue=1 Go Links

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments Current History

Issue Details

Issue 1

Actions

Search completed, no comment found!

Category 1

Enter new action

Issue: Issue 1

Action: Action 1

Save Cancel

Comments

Search completed, no comment found!

Print Back

Enter the action in the space provided and click “Save”. You can enter multiple actions for one issue but please ensure that you only enter one action each time. When you have completed entering the actions, click “Cancel”. You will then be prompted to enter comments.

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File Edit View Favorites Tools Help

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Address http://rhhws03.health.local/Handover/?f=Patient&pId=8624&vType=1&newType=3&issueId=205&isNewIssue=1 Go Links

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments

Current History

Issue Details

Enter new comment

Issue: Issue 1

comment:

Actions

Action 1

Save Cancel

Comments

Search completed, no comment found!

Category 1

Print Back

Done Start Local intranet 3:30 PM

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Enter your comments into the space provided and click “Save.”

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File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print Mail

Address http://rhhws03.health.local/Handover/?f=Patient&pId=7452&vType=1&newType=1&isNewIssue=1 Go Links

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Clinical Handover System

[Go back to Main menu](#)
[Logout](#)

Patient Details

Name:	URN:	Ward: 2BS
Age: 29	Sex: M	
Medical Unit: F	Consultant:	

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments Current History

Issue Details Enter new issue Add New

Issue:

Issue 1

Issue 2

Actions Save Cancel Add New Completed

Action 1.1

Action 1

Done

Start

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Local intranet

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To enter a second issue, click “Add New”. Enter the issue into the space provided and click “Save”.

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Address: http://rhhws03.health.local/Handover/?f=Patient&pId=7452&vType=1&newType=2&issueId=198&isNewIssue=1

[Go back to Main menu](#)
[Logout](#)

Patient Details

Name: _____ URN: _____ Ward: 2BS
 Age: 29 Sex: M
 Medical Unit: F Consultant: _____

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments

Current History

Issue Details

Issue: Issue 2
 Action: Action 2

Actions

Action 1.1
 Action 1

Comments

Comment 1

Save Cancel

Enter the action(s) that is associated with that issue and click “Save” ensuring that you enter one action at a time. When you have completed saving all the actions, click “Cancel”.

Royal Hobart Hospital - Microsoft Internet Explorer

Address: http://rhhws03.health.local/Handover/?f=Patient&pId=7452&vType=1&newType=3

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments

Current History

Add New

Issue Details

Issue 2 Enter new comment

Issue 1

Issue: Issue 2 ...

comment:

Actions

Action 2

Action 1.1

Action 1

Save Cancel

Comments

Comment 2

Comment 1

Category 1

Print Back

Enter the comment relating to that issue in the space provided and click “Save”.

Royal Hobart Hospital - Microsoft Internet Explorer

Address: http://rhhws03.health.local/Handover/?f=Patient&pId=7452&vType=1

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments

Current History

Add New

Issue Details

Issue 2

Issue 1

Add New

Actions

Completed

Action 2 ☐

Action 1.1 ☐

Action 1 ☐

Add New

Comments

Comment 2

Comment 1

Category 1

1

2

3

Print Back

Done

Start

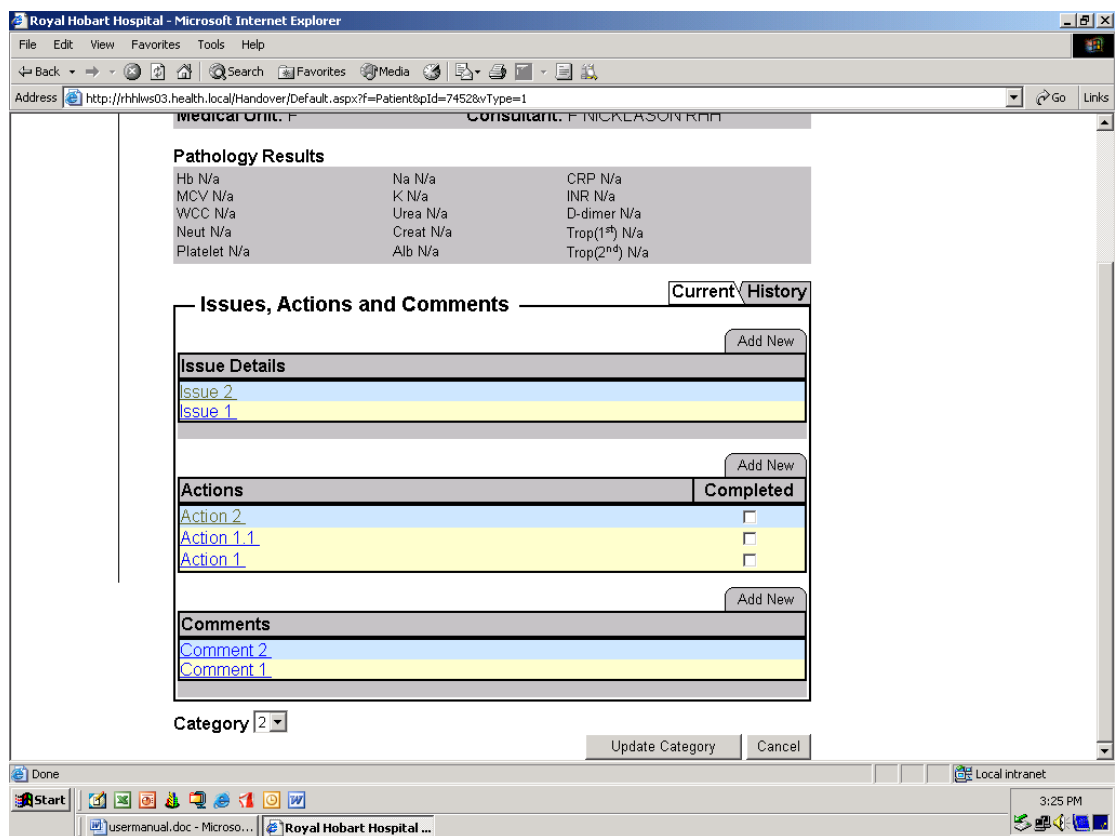
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Local intranet

3:25 PM

When you have completed entering all the handover information, select a handover category from the drop-down list for the patient. 1- Very urgent, 2- Needs to be done during shift, 3- FYI.



Click "Update Category" to update the category for that patient.

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File Edit View Favorites Tools Help

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Address http://rhhws03.health.local/Handover/?f=Patient&pId=7452&vType=1 Go Links

Pathology Results

Hb N/a	Na N/a	CRP N/a
MCV N/a	K N/a	INR N/a
WCC N/a	Urea N/a	D-dimer N/a
Neut N/a	Creat N/a	Trop(1 st) N/a
Platelet N/a	Alb N/a	Trop(2 nd) N/a

Issues, Actions and Comments

Current History

Add New

Issue Details

[Issue 2](#)

[Issue 1](#)

Add New

Actions

Completed

Action 2	<input type="checkbox"/>
Action 1.1	<input type="checkbox"/>
Action 1	<input type="checkbox"/>

Add New

Comments

[Comment 2](#)

[Comment 1](#)

Category 2

Print Back

Done

Start

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Local intranet


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File Edit View Favorites Tools Help

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Address http://rhhws03.health.local/Handover/Default.aspx Go Links

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Clinical Handover System

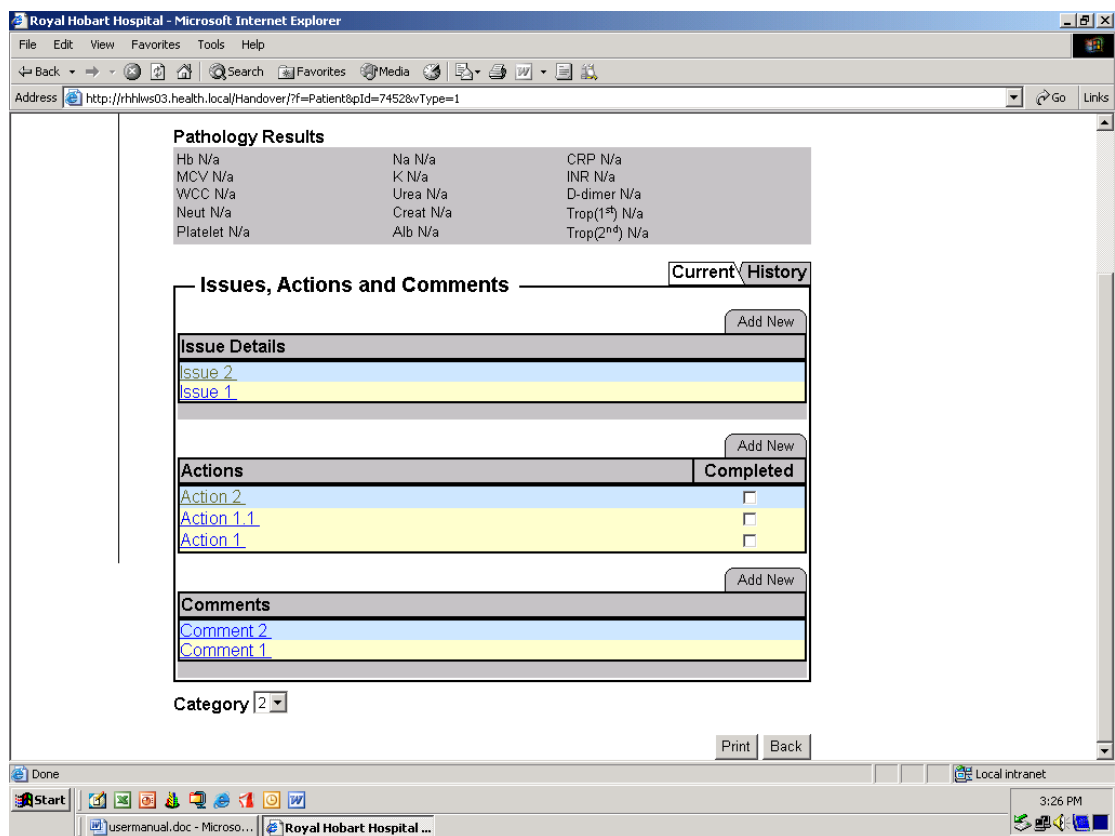
[Go back to Main menu](#)
[Logout](#)

Handover List (Thu, 01 Mar 2007, 15:26)

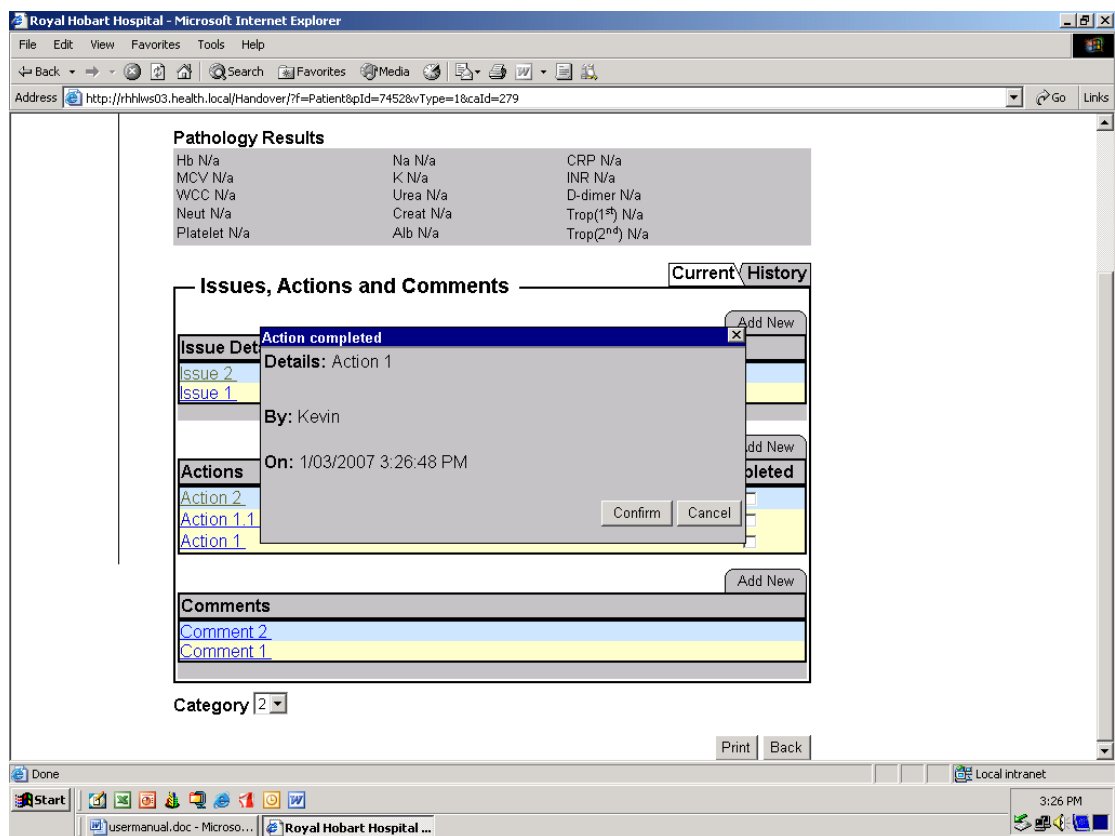
Category	Patient Details	Ward	Pathology Results			Actions
2		2BS	Hb N/a MCV N/a WCC N/a Neut N/a Platelet N/a	Na N/a K N/a Urea N/a Creat N/a Ab N/a	CRP N/a INR N/a D-dimer N/a Trop(1 st) N/a Trop(2 nd) N/a	Action 2 Action 1.1 Action 1

Done Local intranet 3:26 PM

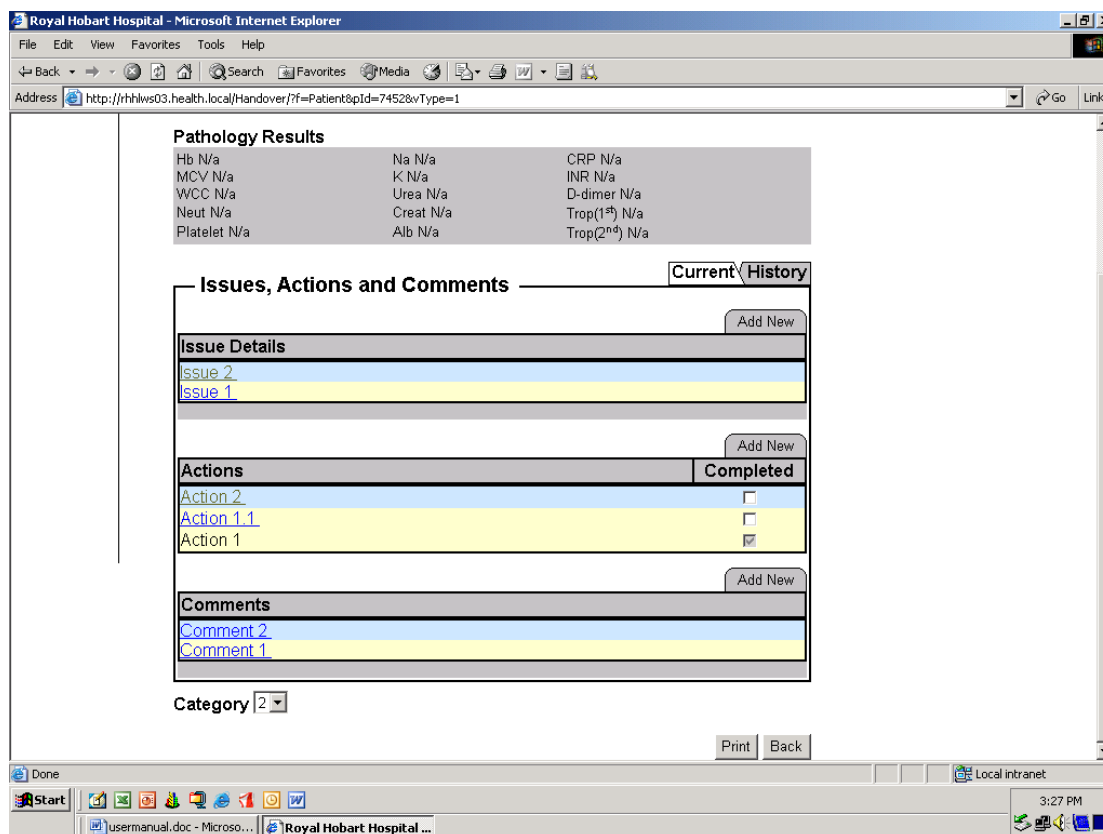
Start usermanual.doc - Microso... Royal Hobart Hospital ...



After you have completed an action, please remember to tick the action as completed.



When you tick the “Completed” box, you will be prompted to confirm if the action has actually been completed. Click “Confirm” if yes and “Cancel” if no.



Once you have completed an action, that action will be greyed out. You will not be able to make changes to that action any longer. That action will also no longer be displayed on the handover list.

Printing

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File Edit View Favorites Tools Help

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Address http://rhlhws03.health.local/handover/Default.aspx Go Links

Department of General Internal Medicine
Clinical Handover System

Go back to Main menu
Logout

Med F Patient List (Thu, 01 Mar 2007)

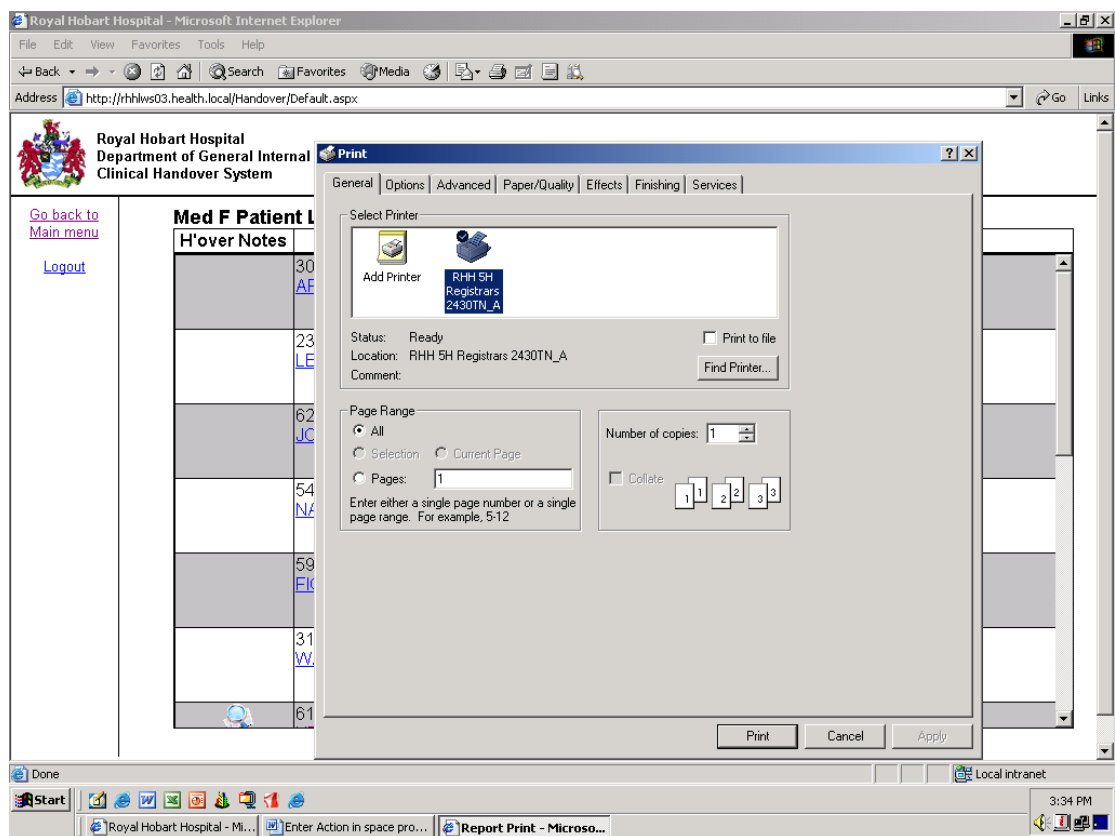
H'over Notes	Patient Details	Ward	Consultant	Pathology Results		
3 Y	XXXXXXXX	2BS-SH	XXX	Hb 140g/L MCV 94fL WCC 5.80/hL Neut 3.7h/L Platelet 229/hL	Na 138mmol/L K 4.5mmol/L Urea 8.1mmol/L Creat 104μmol/L Ab N/A	CRP N/A INR 1.0secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
6 K	XXXXXXXX	2BS-SH	XXX	Hb N/A MCV N/A WCC N/A Neut N/A Platelet N/A	Na N/A K N/A Urea N/A Creat N/A Ab N/A	CRP N/A INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
2 N	XXXXXXXX	2BS-SH	XXX	Hb 129g/L MCV 83fL WCC 7.11/hL Neut 4.8h/L Platelet 392/hL	Na 138mmol/L K 3.7mmol/L Urea 5.1mmol/L Creat 81μmol/L Ab N/A	CRP 62mg/L INR 1.4secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
6 N	XXXXXXXX	2BS-SH	XXX	Hb 115g/L MCV 98fL WCC 70x10 ⁹ /L Neut 6.2h/L Platelet 622/hL	Na 136mmol/L K 4.4mmol/L Urea 5.9mmol/L Creat 96μmol/L Ab 20g/L	CRP 200mg/L INR 1.3secs D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
3 K	XXXXXXXX	2BS-SH	XXX	Hb 116g/L MCV 83fL WCC 7.96/hL Neut 5.2h/L Platelet 326/hL	Na 142mmol/L K 3.8mmol/L Urea 5.2mmol/L Creat 89μmol/L Ab 38g/L	CRP 11mg/L INR 2.2secs D-dimer N/A Trop(1 st) 0.00μg/L Trop(2 nd) 0.04μg/L
2 V	XXXXXXXX	2DC	XXX	Hb N/A MCV N/A WCC N/A Neut N/A Platelet N/A	Na N/A K N/A Urea N/A Creat N/A Ab N/A	CRP N/A INR N/A D-dimer N/A Trop(1 st) N/A Trop(2 nd) N/A
6		2DC		Hb N/A MCV N/A	Na N/A K N/A	CRP N/A INR N/A

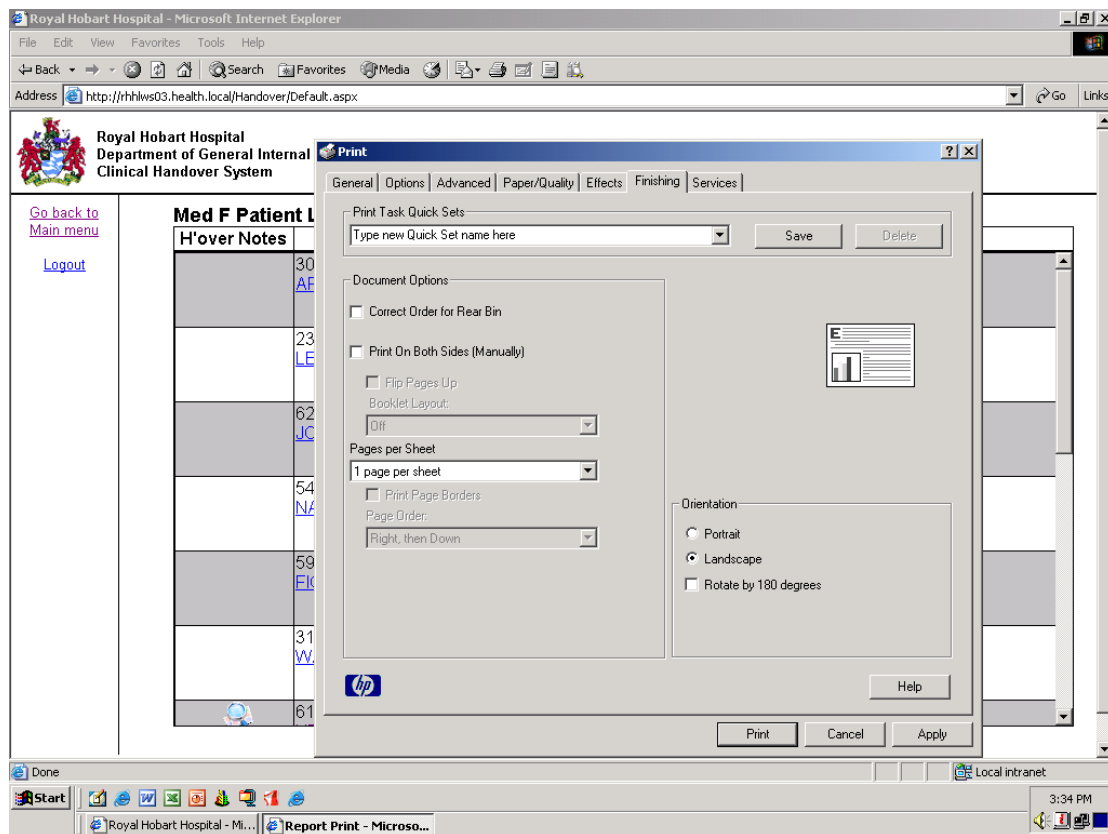
Print Back

Done Local intranet 3:18 PM

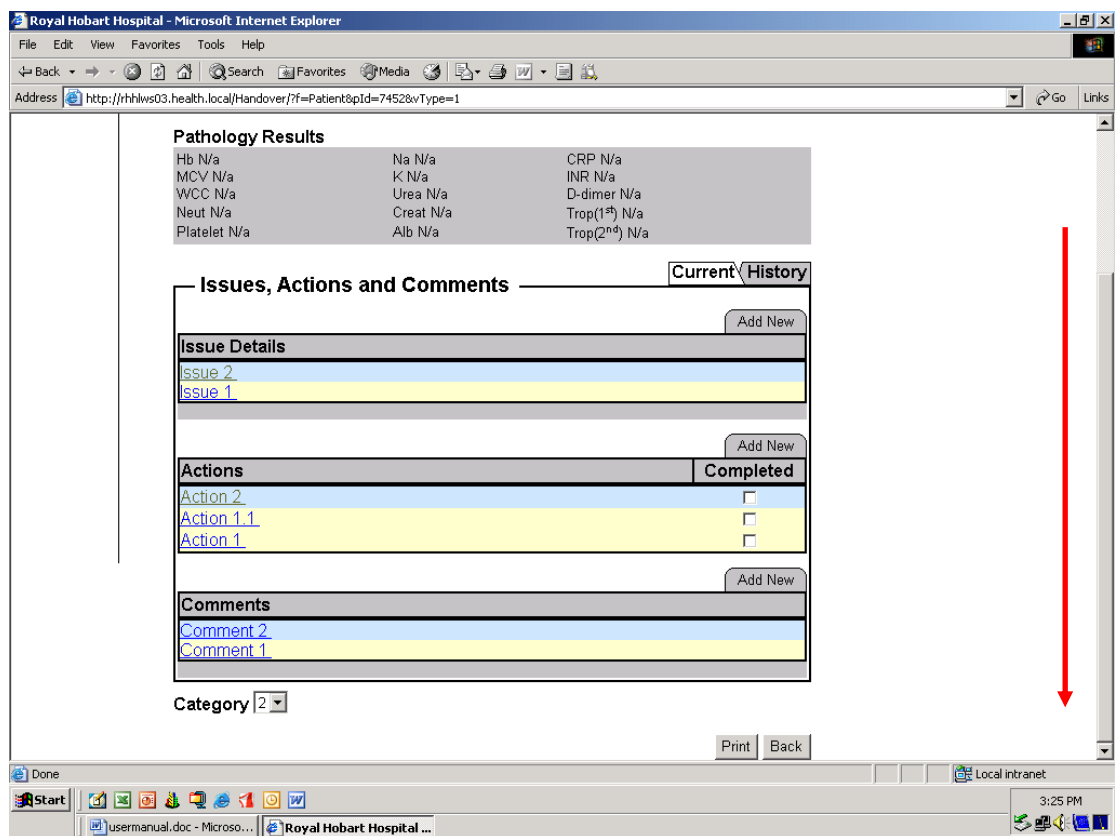
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To print a patient list, scroll down till you see the “Print” button. Click Print.





Select “Finishing” and change the orientation to landscape..



To print each patient's handover information, scroll down till you see the "Print" button at the bottom of the page. Click "Print".